Mobile Communication in the Age of Smartphones

Processes of Domestication and Re-domestication

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Abstract

Recent years have seen great changes to the landscape of mobile communication in Denmark where smartphones have become widespread and the mediascape in general has become increasingly complex as the lines of demarcation among different media have blurred. This dissertation studies the processes of domestication and re-domestication of mobile communication among youth in Denmark in this increasingly complex mediascape. Through five research publications it examines various aspects of mobile communication during a period of transition from an old regime of mobile phones into a new regime of smartphones.

The first article, "*The Socio-demographics of Texting: An Analysis of Traffic Data*" (co-written with Rich Ling And Pål Roe Sundsøy), based on traffic data examines patterns of texting among a universal sample of mobile subscribers to a large Scandinavian operator in 2007, asking: "who texts and with whom do they text?". This article represents a time in the history of mobile communication when SMS texting was at its peak, just prior to the changes that would characterize the mobile mediascape in the years to follow.

The Second article, "*From SMS to SNS – The Use of the Internet on the Mobile Phone Among Young Danes*" (co-written with Gitte Stald), is based on qualitative survey data from a sample of university students collected in the spring of 2011 and explores the contours of the emergent smartphone phenomenon and the motivations young Danes have for using or not using the internet on the mobile phone.

The third article, "*It's Like I Trust It So Much That I Don't Really Check Where It Is I'm Going Before I leave – Informational Uses of Smartphones Among Danish Youth*", like the fourth and fifth articles, is based on qualitative interviews with 31 young Danish high school students. It examines the use of smartphones among these young Danes for accessing and keeping updated with online information as well as the social consequences of having persistent individualized access to information.

The fourth article, "*Why Would You Want to Know? – The Reluctant Use of Mobile Location Sharing Among Danish Youth*", examines young Danes' use (and non-use) of mobile location sharing on Facebook, the most prominent example of a location-sharing service in Denmark.

The fifth article, "*It's Just Not That Exciting Anymore'– The Changing Centrality of SMS in the Everyday Lives of Young Danes*" (co-written with Rich Ling), within the context of this dissertation can be thought of as a companion-piece to the first article. It examines the changing centrality of SMS texting in the communication repertoires of young Danes in the

light of recent media developments, particularly the widespread adoption of Facebook and smartphones.

Acknowledgments

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1 Introduction

Recent years have seen great changes in the mobile mediascape and mobile communication in Denmark and many other countries. Most strikingly, smartphones have become widespread in course of relatively few years (Bertel & Stald, 2013). Although smartphones had previously existed and internet-capable mobile phones had been a reality in Japan for quite some time (Ito, Okabe, & Matsuda, 2005), the history of the modern smartphone arguably first began with Apple's introduction of the category-defining iPhone in 2007 (Agar, 2013), the pivotal "iPhone moment" (Goggin, 2011, p. 128). When Statistics Denmark began collecting information on smartphone ownership four years later in 2011, 33% of all Danish households owned at least one such device; in 2012, this figure had increased to 50% (2013). That same year, smartphone ownership was 77% (and had thus already become the norm) among young people and young adults, the groups who are the most avid users of the technology in a Danish context (Aarup, Nielsen, Steenberg, & Andersen, 2012).

With the smartphone, mobile phones have evolved into networked computers, which, in turn, fundamentally changes what may constitute mobile communication. Where mobile phones have mainly been tools for dyadic person-to-person communication via voice calls and SMS texting, today persistently internet-connected smartphones afford communication patterns as complex as those available on the personal computer. Additionally, they offer possibilities for access to online information as well as various forms of content consumption and production, including multimedia and games.

It is, however, not only mobile devices themselves that have changed in recent years. Concurrent with the adoption of smartphones, other media developments have also occurred that influence mobile communication in direct and indirect ways. One such development has been the extensive uptake of what has been referred to as social network sites (Boyd & Ellison, 2007), in a Danish context most significantly Facebook.[1] After a relatively slow start, Denmark in 2008 had grown to be one of the countries with the highest Facebook penetration rates and by 2009 77% of young Danes used Facebook (J. L. Jensen & Sørensen, 2013, pp. 51–52). Facebook in Denmark in 2012 had become the most popular service on the web measured by time use and young people spend the most time on Facebook of all groups (Association of Danish Media, 2012a, p. 22). Indeed, the service tops the list of daily media

[1] As illustration, 73% of the 9-16-year-old Danes who had a profile on a social network site in 2009 had this with Facebook (Bucht, Livingstone, & Haddon, 2009, p. 60); 90% of the 19-24-year-old Danes in 2009 were

activities by young people surpassed only by SMS texting (Kobbernagel, Schrøder, & Drotner, 2011b, p. 17).

Mobile communication today can not meaningfully be considered in isolation from such developments in the rest of the mediascape as the lines separating different media are increasingly blurred (Goggin & Crawford, 2011; Schroeder, 2010). Taking Facebook as an example, 64% of the 16-19-year-olds today use social network services on their mobile phones (Statistics Denmark, 2012a). Depending on which medium is of greater interest to the observer, Facebook in this case has either been mobilized or the mobile phone has become an interface to the "cloud-based" service that is Facebook; in either perspective the two are tightly interwoven. Furthermore, some aspects of the communication on Facebook are direct functional alternatives—and thus competitors—to traditional mobile communication; this is for instance the case with Facebook messages/chat, which, like SMS, is text-based and asynchronous (DR Medieforskning, 2013; Helles, 2013).

As the definition of mobile communication has expanded and a multitude of services and formats have become available on and around mobile handsets, many questions that were raised and considered in the traditional mobile communication literature have again become relevant as new technologies once more have to find their place in the everyday lives of users, spurring re-assessments of existing technologies in the process. This raises familiar questions such as: What role does the new technology come to play in the everyday lives of users and what are the social consequences of its use? How do patterns of mobile communication and social practices change with the new technology and how does this affect the use of existing media?

Asking and answering such questions has been the hallmark of a specific theoretical approach in the study of media and technology known as the domestication framework (Haddon, 2003; Silverstone & Haddon, 1996; Silverstone, Hirsch, & Morley, 1992). Drawing upon this framework, this dissertation examines the changing practices of mobile communication in the contemporary mediascape as experienced by the heaviest users of the technology, young people. Through five research articles based on data collected in 2007, 2010, 2011, and 2012—and covering what can be considered a transition from an "old" regime of mobile phones into a new regime of smartphones situated in a complex media environment that is characterized by softened lines of demarcation among different media forms—the dissertation examines different aspects of mobile communication in the current mediascape. The overarching research question which has guided the work can be summarized in the following way:

- *In the complex contemporary mediascape, how is the use of mobile communication changing in the everyday lives of young Danes?*

Contained within this broad question and pertaining specifically to the process of domestication are two sub-level research questions:

- *How are smartphones being domesticated by young Danes in everyday life contexts?*
- *How is the use of traditional mobile phone functionality re-domesticated in the light of recent media developments?*

1.1 Structure of the Dissertation

The dissertation first introduces the theoretical background and key concepts of the research project. Initially, the development of mobile phones into smartphones is discussed. This is followed by a discussion of the concept of youth including the "new paradigm" of the sociology of childhood and youth (James & Prout, 1997; Prout, 2005) which again is followed by a discussion of the domestication framework (Haddon, 2003; Silverstone & Haddon, 1996; Silverstone et al., 1992).

Next, the dissertation presents the methodology of the research in the form of a moderately constructivist approach to grounded theory (Charmaz, 2003, 2006) as well at the method and empirical data forming the basis of the analysis.

This is followed by the five research publications that form the main contribution of the dissertation. These articles are based on data collected between 2007 and 2012 and are concerned with various aspects of the domestication and re-domestication of mobile communication in the current mediascape. An overview of the articles is shown in table 1.[2]

No.	Page	Article
1	36	Ling, Rich, Troels Fibæk Bertel, and Pål Roe Sundsøy. "The Socio-demographics of Texting: An Analysis of Traffic Data." New Media & Society 14, no. 2 (March 1, 2012): 281–298.
2	55	Bertel, Troels Fibæk, and Gitte Stald. "From SMS to SNS: The Use of the Internet on the Mobile Phone Among Young Danes." In Mobile Media Practices, Presence and Politics: The Challenge of Being Seamlessly Mobile, edited by Katie Cumiskey and Larissa Hjorth, 198–213. New York: Routledge, 2013.
3	64	Bertel, Troels Fibæk. "'It's Like I Trust It So Much I Don't Really Check Where It Is I'm Going Before I Leave' - Informational Uses of Smartphones Among Danish Youth." Mobile Media & Communication 1, no. 3 (2013): 299–313.
4	80	Bertel, Troels Fibæk. "'Why Would You Want to Know?': The Reluctant Use of Mobile Location Sharing on Facebook Among Danish Youth" (manuscript, submitted).
5	113	Bertel, Troels Fibæk, and Rich Ling. "'It's Just Not That Exciting Anymore'– The Changing Centrality of SMS in the Everyday Lives of Young Danes" (manuscript, submitted).

Table 1: Research publications in the dissertation compilation.

The articles were developed in the order they are presented in the dissertation and follow an internal logic consisting of three distinct phases:

[2] Article 2 is omitted from the printed edition of the dissertation due to copyright restrictions.

Article 1 is based on traffic data collected on the Norwegian network of a large Scandinavian operator in 2007 and examines patterns of SMS texting when the use of this technology was at its peak and prior to the changes brought about by the mass uptake of smartphones and Facebook. In terms of domestication, this article examines the use of a "fully" domesticated technology that has become an entrenched part of the everyday lives of users.

Article 2 is based on mainly qualitative survey data (from open-ended questionnaire items) from a sample of university students collected in the spring of 2011 and explores the contours of the emergent smartphone phenomenon and the motivations young Danes have for using or not using the internet on the mobile phone. In terms of domestication, this article considers the domestication of a the internet on the mobile phone as well as the "pre-domestication" of smartphones qua their status as mobile phones. The insights generated in this article helped lay the foundation for the main study of the dissertation which is reported in the next three articles.

Articles 3-5 are based on qualitative interview data from a sample of 31 Danish high school students collected in the fall of 2011 and spring 2012. Each article examines one specific and distinct aspect of the domestication of mobile media in the contemporary mediascape along the dimensions of *information*, *location*, and *communication*:

- *Article 3* examines the use of information on smartphone handsets as it occurs outside of the context of person-to-person communication and the social consequences of this use in the everyday lives of young Danes.
- *Article 4* examines young Danes' use (and non-use) of mobile location sharing via check-ins on Facebook, the most prominent example of a location-sharing service in Denmark.
- *Article 5* examines the changing centrality of SMS texting in the communication repertoires of young Danes in the light of recent media developments, particularly the widespread adoption of Facebook and smartphones. This article, then, considers the "re-domestication" of SMS in what—within the dissertation—can be thought of as a companion-piece to article 1.

The dissertation closes with a summative discussion of the processes of domestication and re-domestication associated with mobile media in the contemporary mediascape and a general conclusion.

1.2 Delimitations

The use of mobile communication is a very broad topic and a series of delimitations have had to be made in order to focus the analysis in the dissertation. The work presented thus does not consider the production, consumption and sharing of multimedia content or games even though these areas are becoming increasingly prominent and relevant, particularly in the context of smartphones. The main reason behind this choice is that the interview data analyzed for the central articles 3-5 was not sufficiently strong as regards these aspects. Using a grounded theory approach within the context of a three-year Ph.D. project has necessitated focusing the analysis on the themes that have been the most significant in the empirical material. Thus there has been a focus on saturating select categories rather than aiming for breadth of topical coverage. Both multimedia uses and games are, however, very interesting areas for further research.

Another delimitation is caused by the fact that mobile communication in the contemporary mediascape is a moving target as it is still rapidly developing (Ling, 2012, p. 11; Oksman, 2010, p. 11). As such there are aspects of the use of smartphones that have only been introduced (or have become increasingly relevant) after data collection ended for the research presented here. This is for instance the case with applications employing various forms of informational "crowdsourcing" (see Agar, 2013, p. 226 although this term is not used directly), a growing area that is highly interesting as a topic for future research.

The dissertation furthermore considers media use practices among young people in Denmark.[3] As such the specific findings presented in this research may be the most relevant within a Danish or Scandinavian cultural context although certain more general processes identified in the research may be applicable more broadly.

2 Theoretical Background

This section presents the theoretical background for the research presented in the dissertation. First, it briefly reviews central aspects of traditional mobile communication and then proceeds to discuss how the move towards smartphones might change mobile use practices. Next, it discusses the concept of youth and presents the so-called "new paradigm" of youth sociology that has informed the research. It discusses why youth is an important category for studying mobile communication and presents background information about media use

[3] In article 1, the SMS texting patterns of subscribers to a large Scandinavian tele-operator in Norway are examined. Norway like Denmark is a Scandinavian country and the two countries share many common traits including similar histories of ICS development and adoption (Carlsson, 2010).

among young people in a Danish context. The section concludes by introducing the domestication framework which has provided theoretical guidance for the research and informed the dissertations' view on how technology comes to be part of the everyday lives of users.

2.1 Mobile Communication from Phones to Smartphones

2.1.1 Mobile Phones. When the first "modern" mobile phones—phones which in addition to voice communication allowed for textual communication via SMS—were introduced with the GSM standard circa 1992 (Agar, 2013; Hillebrand, Trosby, Holley, & Harris, 2010) it was in many ways a revolution that influenced and changed social practices in most areas of modern life (Rainie & Wellman, 2012).

Most fundamentally, the mobile phone made individuals directly addressable. Where users had previously called household phones, now they could call or text directly to the person they wanted to talk to (Ling & Donner, 2009; Ling & Stald, 2010; Stald, 2000). As the mobile phone could always be carried on the body of the user, individuals furthermore were placed in a state of permanent reachability—always potentially in touch with the network, everywhere (Aakhus & Katz, 2002).

One significant consequence of this persistent person-to-person connectivity was that it allowed users to "micro-coordinate" plans and activities—for instance calling one's partner from the supermarket asking whether to get milk or calling ahead if running late for an appointment (Ling & Yttri, 1999, 2002). The ability of users to micro-coordinate on an ongoing basis in everyday life, it has been argued, has lead to a relaxation of the norms around clock-based timekeeping and punctuality. Schedules and time has "softened" (Ling & Yttri, 2002) and a new "flexible punctuality" has become the norm in many contexts (Larsen, Urry, & Axhausen, 2008). Indeed, according to Ling, this change has arguably been the most significant social consequence of mobile communication (Ling, 2004, p. 69).

Texting via SMS was, of course, one of the primary forces driving the adoption of the mobile phone, with teens in particular making this technology their own (Ling, Bertel, & Sundsøy, 2012; Ling & Bertel, 2013). Young people discovered the communicative potential of SMS, originally designed as a means of delivering service messages to mobile subscribers, and quickly became the most active users of SMS texting and the mobile phone (Agar, 2013; Taylor & Vincent, 2005). Cheaper than voice calls, SMS allowed young people to keep socially updated with their friends at all times, engendering a state of "connected presence" (Licoppe, 2004) through the continuous exchange of short, often phatic, messages. Due to the

reduced visual cues and the asynchronous text-based communication flow, SMS provided users greater control over the interaction than was possible in face-to-face communication. This served to lower the threshold for taking up communication (Kopomaa, 2000) and made "difficult" communication—e.g. flirting—easier (Kasesniemi & Rautiainen, 2004; Oksman & Rautiainen, 2002). SMS furthermore provided users with an inconspicuous means of communication that could be discretely interlaced with other activities (Ling & Donner, 2009)—texting under the dinner table, at meetings or in school being classic examples. For teens, SMS furthermore provided a private space that was largely outside the purview of parents and other authority figures, thus lending itself to negotiations of connectedness and autonomy characteristic of the youth period (Ling & Yttri, 2006). A perfect fit for the increasing orientation towards the peer group and growing independence from parents in this life phase (Mesch & Talmud, 2010), the use of SMS flourished among young people who made it a fixture of youth culture (Caron & Caronia, 2007; Goggin, 2006; Kasesniemi & Rautiainen, 2004; Kasesniemi, 2003). They famously developed various group-specific behaviors—communicating via intentionally missed "bomb calls"[4] (Oksman & Rautiainen, 2003; Oksman & Turtiainen, 2004) and chain messages (Kasesniemi & Rautiainen, 2004) being prominent examples—and developed various forms of SMS specific argot and language (Baron, 2008; Grinter & Eldridge, 2001; Thurlow & Brown, 2003).

Communication via traditional mobile phone functionalities—SMS and voice calls—has been found mostly to be used for strong tie communication (Ling, 2008; Reid & Reid, 2005). However, it has also been used as a venue for cultivating weaker ties. Kasesniemi & Rautiainen for instance found that among young people, SMS texting is often the venue of choice for initiating contact and exploring new relationships (Kasesniemi & Rautiainen, 2004, p. 183). Oksman & Turtiainen similarly found that romantic relationships between teens frequently begin through SMS messaging (2004, p. 326). Oksman and Rautiainen describe how humorous chain messages are sometimes sent to initiate a relationship and gauge the interest of the other. Gradually the relationship then develop from this starting point becoming increasingly intimate and personal (Oksman & Rautiainen, 2002, p. 28).

While the primary functionality of mobile phones has been that of voice calls and SMS texting, it is clear that mobile phones were not limited to this functionality. Over time, mobile phones steadily grew to also increasingly include functionalities such as media playback, games, cameras and in some cases GPS.

[4] This practice has since been become more widely known as communicating via "missed calls" (Donner, 2007).

2.1.2 Smartphones. While the functionality of traditional mobile phones had been steadily evolving and smartphones had existed for several years prior to 2007, the modern smartphone phenomenon arguably started with the release of the original Apple iPhone that year.[5][6] Indeed, "[s]martphones were not invented by Apple, but they were defined by Apple" Agar argues (2013, p. 181) pointing to two innovations introduced with this device, multi-touch screen and the app store, as particularly characteristic of the smartphones phenomenon. In this dissertation, I prefer avoiding the use of a technology-based definition of smartphones as such a definition risks being both somewhat arbitrary and rapidly outdated (see Bertel & Stald, 2011). Such a definition, furthermore, is also not particularly relevant in the present context because the research interests of the dissertation are social practices and mobile communication, and the specific technological configuration of a user's handset—beyond a few macro-level characteristics—is not central in this regard. What, then, may be said to constitute a modern smartphone more broadly? Starting with the observation that mobile phones with smartphones have evolved into computers, Bertel and Stald look to the functionalities of smartphones that appear to have a special potential for influencing social practices and mobile communication when attempting to define what constitutes a smartphone. In this context they argue that (at least) three macro-level features are fundamental to modern smartphones; 1) smartphones have the computing power and technical platform to install and run applications and access internet content, 2) they provide (at least in principle) persistent internet connectivity, and 3) are typically equipped with positioning technology, often GPS. These three aspects are of course quite often interrelated and interdependent with the combination of a powerful open computer platform, internet connectivity, and various sensors each adding to the whole (Bertel & Stald, 2013; see also Watkins, Hjorth, & Koskinen, 2012).

The fact that users via the smartphone carry with them a networked computer at all times may, at least in principle, have wide ranging consequences, leading to a tighter

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[5] It should be noted that Japan has a markedly different history of mobile communication than most other countries due to the popularity of the scaled-down mobile internet that was available through the proprietary i-mode standard (Agar, 2013; Ito, Okabe, & Matsuda, 2005). As such, Japanese mobile phones have for several years provided "smart" functionality that in a western context is only now becoming commonplace. In a North American context, Blackberry also enjoyed great popularity, particularly as a tool for mobile email in the business sector (Middleton, 2007), but also for direct ("PIN") messaging among young people (Agar, 2013) prior to 2007.

[6] It should also be mentioned that changes to macro-structural conditions such as the development of the GSM and 3G standards and networks were central enabling factors in the development of the smartphone phenomenon. I will not enter into a discussion of such factors at this time, but refer instead to Agar (2013, p. 183ff.) and Goggin (2011, p. 116ff.).

integration between "offline" and "online" dimensions of everyday life. On the one hand internet is lifted out of the use context of the personal computer to be "further integrated into the mobile micro flows of everyday life" (Bertel & Stald, 2013, p. 210) and on the other hand information may be fed back from the user to the internet to be used in various online services (Bertel, submitted).

This has consequences for mobile communication as the communication forms that are available on mobile handsets change when mobile phones become networked computers. Where traditional mobile communication was primarily dyadic in nature, most often occurring between two individuals at a time, today smartphones allow for communication patterns equally complex to those associated with the personal computer; beyond flows of dyadic communication this includes various forms of "mass self-communication" (Castells, 2009) occurring in quasi-broadcast and many-to-many communication flows (for an overview of types of flows in digital communication, see K. B. Jensen & Helles, 2011). The fact that social network software such as Facebook and Twitter can now also be used with mobile handsets further means that the mobile device itself can be used to reach a larger audience than was the case previously; where the traditional mobile phone functionalities of voice calls and SMS texting were primarily used for communication with strong ties (Ling et al., 2012), the mobile handset today can also be used to support a larger network of weaker ties.

Smartphones also influences the use of the internet which may increasingly be relied for just-in-time searches for information (Church, Cousin, & Oliver, 2012; Church, Smyth, Cotter, & Bradley, 2007; Cui & Roto, 2008). Freed from the use context of the computer information on smartphones may be accessed anywhere and at any time. However, smartphones do not only mobilize the internet. Rather, they are increasingly emerging as special devices as services and apps exploit their unique combination of features to offer fundamentally new functionality. One example of this is location-based games such as Foursquare[7] which rewards the user symbolically for "checking in"[8] at various geographic locations (Gordon & de Souza e Silva, 2011). Another example is crowdsourcing apps such as Waze, a navigation service based on the collection and pooling of information from its users whose mantra is "Outsmarting traffic, together".[9]

[7] http://www.foursquare.com
[8] When "checking in" users send their current GPS location—collected by the smartphone—to the system.
[9] http://www.waze.com

While the smartphone is arguably more an evolutionary step in the history of mobile communication and the internet than a revolutionary one, it is clear that smartphones as multi-functional networked and highly portable computers hold a great potential for influencing existing mobile use practices as well as for introducing new ones. It is, however, a potential that must be realized—and studied—in the context of the wider mediascape. Smartphones symbolize media convergence *par excellence* (Watkins et al., 2012) and as such cannot be understood in isolation from other technologies. The dissertation for this reason will situate smartphones in their wider context technological and consider the use of smartphones in relation to both traditional mobile communication and internet-based services.

2.2 Danish Youth and ICTs

2.2.1 What is Youth? Youth is both a commonly used and at the same time elusive term that has been defined a multitude of different ways in various contexts. The concept has been defined, for instance, as biological age, as a developmental stage, as a life phase, as a life style, as a position in the social structure, and as a form of culture (Fornäs, 1995; France, 2007; Furlong & Cartmel, 2007; Gundelach & Nørregård-Nielsen, 2002).

This dissertation approaches the concept of youth from the theoretical perspective of the so-called "new paradigm" of the sociology of youth and childhood (Ito et al., 2010; James & Prout, 1997; Prout, 2005). This has a number of implications. First, youth in this theoretical perspective is considered socially constructed and historically variable; while biological age is universal across human cultures, the social meaning associated with a given biological age is not. Second, young people's relationships and cultures are considered worthy of study in their own right and as such the new paradigm aims to take youth serious as actors in their own social worlds. Third, the perspective highlights that the social variable of youth cannot be considered in isolation but is always dependent on other variables such as class, gender, and ethnicity.

Compatible with this theoretical perspective, youth can be defined as a socially constructed intermediary "period of social semi-dependency, framed by legislation and cultural norms, which forms a bridge between the total dependence of childhood and the independence of adulthood" (Furlong & Cartmel, 2007, p. 55). The boundaries of this intermediary period are fuzzy and cannot be linked directly to chronological age or, in case of its end point, specific behaviors such as paid work or living with a partner (Furlong, 2013, p. 1; Heinz, 2009, p. 3).

From an operational standpoint, the dissertation studies media use among three different groups of young people. Articles 3-5 study media use practices among a sample of 31 Danish high school students sampled from three different schools and aged 16-21 (M=17.7, SD=1.1), who by most definitions are considered young. All but one of these respondents are teenagers and even when counting the single 21-year old in the sample, the respondents are still firmly within common definitions of youth such as the one employed by UNESCO that covers the age span between 15 and 24 (UNESCO, 2013).

Second, article 2 studies the media use practices among a sample of 216 university students aged 18-30 (M=25.1, SD=2.9) who are studying various aspects of information technology at the IT University of Copenhagen. While the youngest of these respondents are of similar age to the oldest high school students, it is clear that some of the older university students have life circumstances that are very different from those of a 16-year-old high school student. In this group many have paid work beside their studies, many live with a partner and some have children. As such, the term "young adult" (Furstenberg, Rumbaut, & Settersten, 2005) might be a more accurate description of the oldest of these respondents and one that stresses their difference from the younger students. On the other hand it may be argued that while they are indeed biologically older than the youngest of the university students, the older students are still part of a student environment at a university and that this institutionalized role, and the life experience that goes along with it, binds the differently aged students together more than age sets them apart.

Importantly, however, the point in conducting a survey with this group of IT University students was not so much to study youth-specific use practices as to gauge how the internet was being used on the mobile phone among a sample of people who are early adopters of such technologies in order to gain an understanding of the emergent smartphone phenomenon.

Third, article 1 examines the texting behavior of a universal sample of mobile subscribers aged app. 10 to app. 90 on the Norwegian networks of a large Scandinavian operator. The SMS texting behavior of young people aged 16-22 takes center stage in the article, as this group are found to be the heaviest texters of all age groups. This group, like the high school students and the youngest of the university students, are considered young by most definitions.

2.2.2 Why Study Media Use among Young People? One reason that youth is an interesting category for the exploration of mobile technology is the assumption that young people are

typically at the forefront of media adoption and use and that use practices found early in this group may be indicative of practices that will later become prominent in other user groups. Such a view is succinctly articulated by Castells, Fernandez-Ardevol, Qiu, and Sey when they argue about young people that

> "because they use these technologies more frequently, better, and faster, they reveal potential uses for the technology more rapidly. Youth culture is at the cutting edge of cultural and technological innovation, without prejudging the merits of this innovation." (2007, p. 247).

The assumption that being young equals heavy and competent use of technology, however, is not without problems. Left unquestioned, it, most significantly, runs the risk of perpetuating problematic narratives about intergenerational digital divides—such as the distinction some have made between younger "digital natives" and older "digital immigrants" (Prensky, 2001)—when in fact empirical evidence suggests much more complex and fluid patterns of media use and competencies across and within generations (Livingstone, 2009; Loos, Haddon, & Mante-Meijer, 2012). As I have argued elsewhere, different life phases often entail different media choices such as when (working) adults are heavier users of mobile email than young people (Bertel, 2013, p. 301). Young people, then, clearly are not *always* the heaviest users of *all* new technologies. They are also not necessarily particularly proficient at using new technologies (Loos et al., 2012, p. 209), neither are they necessarily innovative in their use but may in fact often be rather conservative (Fornäs, 1995, p. 2). Furthermore, young people cannot be considered a homogenous group as regards access to technology, individual competencies, or indeed the configurations of the wider contexts of their individual lives (Buckingham, 2008).

Bearing such caveats in mind, young people are in fact, however, among the heaviest users of smartphones and the mobile internet in Denmark—a point that I will elaborate on in the following section. For this reason, studying media use among youth may help us understand current and future use practices as well as potentials and problems associated with the new technology more generally.

While an important reason, early technology ownership and use is not the only reason that youth is an interesting category for exploring practices of mobile communication. Indeed, the youth period because of its transitional and formative character also forms an arena where media use is potentially more intense than in other groups. Between the poles of childhood and adulthood, youth is a developmental period central to the formation of personal identity, in which young people "construct, experiment with and present a reflexive

project of the self in a social context" (Livingstone, 2008, p. 396). Furthermore, the peer group in youth becomes the primary reference group as young people negotiate independence from parents and increasingly turn to peers for guidance and social support (Mesch & Talmud, 2010, p. 9). Such processes today often play out at least in part through digital media. As Ito et al argue

> "Today's youth may be engaging in negotiations over developing knowledge and identity, coming of age, and struggling for autonomy as did their predecessors, but they are doing this while the contexts for communication, friendship, play, and self-expression are being reconfigured through their engagement with new media." (2010, p. 1)

Furthermore, digital media—be they mobile phones or social network sites— provide young people with continuous access to their peers in social spaces that are "theirs", "visible to the peer group more than to adult supervision" (Livingstone, 2008, p. 396). As such, the access to and use of digital media arguably is especially central in youth and for this reason—in addition to their high degree of ownership and use of new technology—youth is an important category for exploring technology.

2.2.3 ICT Use among Young Danes. Young Danes live in a country that has a long history of early adoption of ICTs (Drotner, 2001). In 2012, 92% of all households owned at least one computer and 81% more specifically owned at least one or more laptop computers (Statistics Denmark, 2012b). Surveys from 2009 and 2011 found that nearly everyone above the age of 10 had their own mobile phone (Bucht, Livingstone, & Haddon, 2009; Kobbernagel, Schrøder, & Drotner, 2011a). Among the 15-34 year-olds, 77% in 2012 owned smartphones (Aarup et al., 2012). Virtually all young people in Denmark use the internet (Statistics Denmark, 2012b), and 78% of young people aged 16-19 in 2012 used the internet on mobile phones (Statistics Denmark, 2012a).

Ubiquitous among Danish youth since at least 2004 (Bille, Fridberg, Storgaard, & Wulff, 2005), traditional mobile phone functionalities remain very popular. SMS texting was used by 98% of the 16-19 year-olds in 2012 (Statistics Denmark, 2012b), and 87% of the 13-23 year-olds in 2011 used SMS on a daily basis, topping the list of daily media activities in the group (Kobbernagel et al., 2011a, p. 17). The use of voice call functionality was also very high in this age group at 97% although only 54% used voice calls on a daily basis (Kobbernagel et al., 2011b, p. 27).

Despite its continuing popularity, the use of SMS texting today is declining in Denmark and has been for some years. The total volume of sent messages peaked in the first half-year

of 2010[10] and has dropped 17% between then and the second half-year of 2012. The most significant decrease has taken place in the very recent past with the number of sent SMS messages dropping 8.2% between the second half-year of 2011 and the second half-year of 2012 alone (The Danish Business Authority, 2013b). Mobile voice telephony on the other hand has increased 24% between the second half-year of 2008 and the second half-year of 2012 (The Danish Business Authority, 2013b); this has co-occurred with a general decrease in the cost of mobile telephony over the last 10 years by as much as 75% in fixed price comparison (The Danish Business Authority, 2013a, p. 29).

Smartphone ownership in recent years has become widespread in Danish society. In 2011, 33% of all households owned at least one smartphone and one year later this figure had increased to 50% (Statistics Denmark, 2013). Youth (and young adults) are the most avid adopters of smartphones in Denmark. A 2012 survey found that among 15-34-year-olds, 77% owned smartphones (Aarup et al., 2012). This finding was confirmed by another survey from the same year which similarly found that among the 16-19-year-olds, 75% owned smartphones (Association of Danish Media, 2012b). Among the 16-19-year-olds, 78% used the internet on the mobile phone in 2012 as compared with 55% of the total population (Statistics Denmark, 2012a).

Looking at select uses beyond SMS texting and voice calls, 45% of the 16-19-year-olds in 2012 used GPS on their mobile phone and 46% used mobile email. Both of these figures are relatively low compared to the 20-39-year-olds where 60% use mobile GPS and 58% use mobile email, which again underscores that being young does not always equal being the heaviest users of technology. While not mentioning Facebook explicitly, 64% of the 16-19-year-olds use "social networking services" on the mobile phone (Statistics Denmark, 2012a). In a Danish context, the term "social network site" is, however, virtually synonymous with Facebook. Indeed, Facebook is by far the most well known and used social network site in Denmark (J. L. Jensen & Sørensen, 2013, p. 51). It was the most popular service on the web in Denmark in 2012, measured by the amount of time users spent on the service, and the 15-24 year-olds used Facebook the most (Association of Danish Media, 2012a, p. 22). A survey from 2009 found that among 16-24 year-old Danes, 90% used social networking services and 77% specifically used Facebook (J. L. Jensen & Sørensen, 2013, p.

[10] Measured differently, the use of SMS has in fact been decreasing for longer. The number of sent SMS messages per subscription per half-year has been declining since 2008. In 2012, an average subscription sent 127 SMS messages per month, whereas in 2008 the corresponding figure was slightly above 161 (The Danish Business Authority, 2013a, p. 12).

52). Another survey from the same year conducted among children and young people aged 9-16 similarly found that 73% of those who had an online profile had this with Facebook (Bucht et al., 2009, p. 60).

Taken together, the above shows that mobile computers, mobile phones, and smartphones are widespread in Denmark and that traditional mobile phone functionalities (SMS and voice calls) remain very popular. Furthermore, young people in general are among the heaviest users of smartphones and the mobile internet. They are also the heaviest users of Facebook on both the computer and the mobile phone.

2.3 Domestication of Media and Technology

This dissertation draws upon the domestication framework in understanding how users appropriate new media technologies (Berker, Hartmann, Punie, & Ward, 2006; Haddon, 2003; Silverstone & Haddon, 1996; Silverstone et al., 1992; Silverstone, 1994). While not necessarily referenced explicitly in all the articles in the compilation, the approach has guided the research project in all its phases and connects the various papers.

Central to the domestication approach is the evocative and apt metaphor of "domestication" itself, which designates an appropriation process in which a "wild" technology is "tamed" by users as they fit technology into everyday practices and routines, making it their own. The domestication framework employs a predominantly micro-sociological perspective, paying special attention to the socially contextualized use of technology in everyday life settings among individuals and groups. Having a focus on micro-level appropriation and consumption processes, it approaches the subject matter in an interpretative manner and is usually coupled with qualitative methods, such as ethnography and qualitative interviews (Bakardjieva, 2011).

In what follows, I will outline the history and theoretical underpinnings of the approach, its basic assumptions, contexts in which it has been developed and used, and the relevance of the approach for the current study.

2.3.1 History and theoretical context. The domestication approach was developed in Great Britain in the late 1980s and early 1990s in a series of studies of media use in households (Silverstone et al., 1992; Silverstone, 1994). It drew its main inspiration from anthropology, consumption studies, and media studies (Haddon, 2006, 2007, 2011; Silverstone, 2006). Important points of inspiration were the insights that goods have a symbolic nature (Haddon, 2003, p. 44) and that (media) consumption is an active process, indeed a form of production, "where any and every kind of textual engagement [draws on] personal, social and cultural

resources in such a way as to leave the original, if such a thing [can] be identified, as significantly affected in use." (Silverstone, 2006, p. 232).

Implicit in the concept of domestication and central to the approach is a strong focus on the active role of users in appropriating media. Thus, the domestication approach challenges technological determinist positions expressed for instance by the common "media effects" discourse, where media (and media texts) are assumed to have more or less direct effects on its users (Haddon et al., 2005, p. 3; Silverstone, 2006, p. 230). Questioning such "effects" thinking, the domestication approach sees the social and the technological as mutually shaping; both the human and the technological is shaped in their interaction and are found to be in a constant dialectic of change (Boczokowski & Lievrouw, 2008; Silverstone, 2005, 2006).

The domestication approach is not alone in challenging technological determinism (Hynes & Richardson, 2009; Silverstone & Haddon, 1996). Other significant and related contributions in this vein are approaches found under the umbrella term of social shaping of technology (MacKenzie & Wajcman, 1999; Williams & Edge, 1996); for instance the social construction of technology (Bijker, 1987) and actor-network theory (Latour, 1987).

Although many assumptions and theoretical underpinnings are common to both the social shaping and domestication approaches, and although the former appears to have been an indirect influence on the latter (Hynes & Richardson, 2009; Silverstone, 1994, 2006), the two approaches have relatively independent histories and have often differed in their research interests (Boczokowski & Lievrouw, 2008). Approaches in the social shaping of technology tradition have mainly been preoccupied with the social shaping in processes of invention and design of technology (Aune, 1996; Williams & Edge, 1996), whereas the interest in domestication studies lies primarily in the social shaping that occurs through (active) consumption of media and technology by users in everyday life contexts (Silverstone, 2006).

While these approaches have developed relatively independently, some scholars have found them to be complementary and attempts have consequently been made at theoretical bridge-building; this has, for instance, been the case in Silverstone & Haddon's discussion of the so-called "design/domestication interface" (1996) and more generally among a group of Norwegian domestication researchers (Aune, 1996). When the approaches have been combined, "those making a connection between traditions see domestication as addressing the issue of how the social shaping continues after ICTs have started to be taken up" (Haddon, 2006, p. 198). Typically this shaping occurs among users in everyday life contexts (see for instance Green & Haddon, 2009; Williams & Edge, 1996).

2.3.2 Domestication in households. The domestication approach was first developed and applied to the study of television and (early) ICTs in households (Haddon, 2006; Silverstone et al., 1992; Silverstone, 1994). For this reason the concept and approach has often been linked with the context of the household. Indeed, it was also in relation to this context that some of the core theoretical constructs of the approach were developed. While often downplayed in studies outside of the domestic context (see for instance Bolin, 2010; Haddon, 2003; Hijazi-Omari & Ribak, 2008; Scifo, 2005), these constructs help clarify the research interests of the domestication approach and for this reason will be presented in what follows. These constructs are the "moral economy" of the household, the six moments in the domestication process, and the double articulation of media technologies.

First, the concept of the "moral economy" aims to capture the fact that households are both economic and moral units of production and consumption. Households participate in society in part through their (symbolic and economic) production and consumption of goods, and at the same time they have values, meanings, priorities, and ambitions etc. which characterize the particular household and which shape and inform the behavior of household members including their patterns of economic production and consumption (Silverstone et al., 1992; Silverstone, 1994).

Second, domestication is sometimes described as occurring through a series of non-discrete "moments" reflected in a rough "model" (Silverstone, 1994, p. 124). The model identifies six moments of domestication: commodification, imagination, appropriation, objectification, incorporation, and conversion (Silverstone, 1994, p. 122ff.). *Commodification* designates the industrial and commercial processes of bringing products to market. *Imagination* is associated with the work of advertising in rendering commodities as objects of desire and the way a product enters the consciousness of consumers (Ling, 2004, p. 28; Silverstone, 1994, p. 125). Both of these moments can be said to involve "pre-domestication" of the product as producers attempt to take into account the end user in the design and advertising of the commodity (Silverstone & Haddon, 1996, p. 69). *Appropriation* stands for the whole process of consumption. In the context of households, it describes the moment when the object enters and is under the provision of the moral economy of the household (Silverstone, 1994, p. 126), that is, the moment that it is owned. Having thus entered the household, *objectification* refers to the actual use and display of the object as well as the spatial placement in the domestic sphere (Silverstone, 1994, p. 127). *Incorporation* describes those aspects of use that pertain to the everyday routines of the household members, and how the technology is made to fit within these routines (Silverstone, 1994, p. 129). Finally,

conversion describes the process of displaying the use and consumption of the technology (and reaping the symbolic rewards associated with it) in communication with the outside world as the household "defines and claims for itself and its members a status in neighbourhood, work and peer groups in the 'wider society'" (Silverstone et al., 1992, p. 22).

Third, some scholars have stressed the importance of the "double articulation" of media technologies as material objects and as mediated content (Boczokowski & Lievrouw, 2008; Livingstone, 2007; Silverstone, 1994). Media are physical objects but importantly are also "portals to other worlds that open up realms of the imaginary, connecting the domestic living room—staggeringly—to the rest of the globe" (Livingstone, 2007, p. 17). This double articulation distinguishes media technologies from all other objects and both aspects must be taken into account in their study (Boczokowski & Lievrouw, 2008). Media are experienced as a totality of material object and symbolic content, and approaching the study of media in everyday life with this in mind may help sensitize the researcher to the significance of both dimensions. In the light of more recent media developments, Hartmann (2006) has argued that media, rather than doubly articulated, should be understood as triply articulated; as material objects, symbolic environments and individual texts. This understanding, then, further sensitizes the domestication researcher to the different levels at which media technologies are consumed.

The above constructs, in particular that of the "moral economy" and the model of consumption, clearly reflect the context in which they were first developed and applied, namely in studies of media (often television) use in households. When the domestication framework has been applied outside households or similar social units, these constructs have tended, as mentioned previously, to be downplayed as their relevance is not as apparent in such contexts. For a very interesting application of the concept of double articulation in the context of mobile telephony, however, see Hijazi-Omari and Ribak (2008).

2.3.3 Domestication beyond households. Later, the domestication approach has been applied more broadly in contexts beyond the domestic. Some have studied domestication processes in contexts that, while not domestic, are in some ways similar to households; computer courses for dis-advantaged users (Hynes & Rommes, 2006), small businesses (Pierson, 2006), and university settings (Koskinen, 2012) are examples of such studies of spatially bound practices among collectives of individuals.

Others have applied (or provided legitimization for the application of) the approach in fully mobile settings (Bolin, 2010; Green & Haddon, 2009; Haddon, 2003, 2011, 2013; Ling,

2004). In such contexts, invoking the concept of domestication is sometimes used more as shorthand for a set of assumptions associated with domestication (rather than the specific theoretical constructs noted above), as "a useful way of reflecting 'a package' of understandings lying behind particular studies without the need to explicitly go through them each time" (Haddon, 2003, p. 52)—see for instance Scifo (2005) and Baron (2008). The following section explores what this "package of understandings" can be said to consist of.

2.3.4 General assumptions of the domestication approach. Adopting a bird's eye view of the domestication approach, a set of broad assumptions with general applicability can be said to characterize the framework (adapted from Haddon, 2003). A first assumption is that the appropriation of media and technology is to be understood in terms of "consumption". Rather than merely considering adoption and use, the approach adopts a broader focus on how media and technologies are experienced; what meanings are ascribed to them; how their (conspicuous) consumption, use, and display becomes part of the identities of users (and rejecters) and how they are appropriated actively by users in everyday life (Haddon, 2003, 2006; Ling, 2004). As such, the approach has a clear and distinctive micro-sociological focus on the agency of users in appropriating (or "consuming") technology in everyday life.

A second assumption is that appropriation of media and technology is a (never finite) process rather than an event. Domestication is, according to Silverstone, "a process of both taming the wild and cultivating the tame" (Silverstone, 1994, p. 174). As such, domestication is never fully successful and does not have an end point. As the communication repertoires increase via new media developments, the role of existing technologies may change, their use becoming more specialized or rendered obsolete (Haddon, 2005). New functionality may be added to existing media, changing their use and the meanings associated with them; this fact has been made particularly clear with the rise of the app phenomenon following the introduction of the iPhone App Store in 2008 (Flueckiger, 2012). The needs of users, too, may change as they enter different life phases or circumstances otherwise change. Changes such as the above may then spur processes of re-domestication or even dis-domestication (Green & Haddon, 2009; Sørensen, 1994).

A third assumption is that media use must be studied in context. Even when technologies are mainly used by individuals this does not happen in a vacuum, neither socially nor symbolically. In the special case of households as well as in the more general of peer groups (Haddon, 2013), the immediate social context (rules, norms, expectations etc.) influences the use of individuals and must be taken into account. Further, consumption is

never a private matter as the individual by consuming technology necessarily participates materially as well as symbolically in the wider public culture of consumption (Silverstone, 2006, p. 234).

2.3.5 Application of domestication in the dissertation. In this dissertation, the domestication framework will be used to study the appropriation of new mobile technology in the form of smartphones as well as to study the re-domestication of traditional mobile communication as part of an increasingly complex mediascape.

The analysis in the current research has made two choices in the application of the domestication framework that deserves special mention. First, while often associated with the social unit of the household, domestication occurs at both individual and social levels (Aune, 1996) and in this dissertation is studied at both these levels. Mobile handsets today not only enable (social) communication between and among individuals but also provide a range of functionalities that are used by individuals independently from other individuals; for instance they provide access to various information systems through browsers and apps. The use of such functionality is not always entirely independent from other individuals—as it may for instance influence and be influenced by the social context—but since other individuals are typically not directly involved in the appropriation or use of such functionality, the social context plays a relatively small role.

Second, the co-present use of smartphone terminals is not discussed in the dissertation. To elaborate on this point, the smartphone, it can be argued, is a special medium in terms of domestication as it comes to us "pre-domesticated", "marrying the form of a previous technology (the mobile phone) with the content of another (the Internet)" (Bertel & Stald, 2013, p. 201).[11] Most significantly, even though the functionality of mobile handsets with smartphones increase dramatically, the mechanics of the user's interactions with such devices are often very similar to those associated with the mobile phone. This means that from a co-present other's point of view, the uses of smartphones are not dramatically different from the uses of the mobile phone and for this reason many of the "battles" over the appropriate use of smartphones in social situations have at this point become quite familiar. This aspect of the

[11] The concept of pre-domestication has previously been employed in the domestication literature but in a slightly different way. Silverstone and Haddon (1996) use the concept to refer to the attempt of designers to anticipate in the design of an object its future use. Without using the term pre-domestication explicitly, Haddon similarly states that "ICTS come into consumer perceptions with their meanings pre-formed" (Haddon, 2003, p. 44) as a result of such processes as advertising, design, and media discourses. Bertel and Stald's use of the concept stresses in addition to such factors previous experience using similar media forms.

use of smartphones consequently has not been a priority in the current research and, furthermore, did not emerge as an important theme in the empirical material.

3 Methodology

The dissertation compilation consists of five research publications based on a variety of empirical data. The focus in what follows will be mainly on the interview study conducted among Danish high school students which is reported in articles 3-5. In the context of this dissertation, articles 1 and 2 were important in establishing background knowledge and focusing the research project, but it is the interview study that is the most central in answering the research questions of the dissertation.

This section first introduces the moderately constructivist approach to grounded theory that has guided the data generation and analysis and broadly describes how this has been applied in the interview study. Next, it proceeds to present practical aspects of the execution of the study, including the application of methods. The section concludes with an overview of additional empirical data which—beyond the interview data—have been collected and analyzed for the dissertation.

3.1 Grounded Theory and Qualitative Interviewing

When embarking on an empirical research project, choices must be made pertaining to the methods and methodology the project will employ. In this study a grounded theory methodology was chosen in combination with qualitative in-depth interviewing.

3.1.1 Choosing a qualitative approach. The most fundamental choice in the research design was choosing between a qualitative and quantitative approach. The main difference between the two approaches in the present context is that using a quantitative approach would necessitate that the categories of interest were defined prior to data collection whereas a qualitative approach would not come with such a demand. While defining the categories of interest beforehand can be a very effective research strategy when the field of research is well defined and relatively well-known, it is a less well-suited for situations characterized by great complexity or when the phenomenon under study is still relatively underexplored (Dahler-Larsen, 2008, p. 25). The use of smartphones is an emergent phenomenon that is embedded in a complex and changing mediascape, and for this reason the flexibility and the potential for exploration that characterizes qualitative methods (Lindlof & Taylor, 2011, p. 29; Schrøder, Drotner, Kline, & Murray, 2003, p. 31) was favored. This choice was also

supported by the fact that the study uses the domestication framework, which, due to its micro-sociological focus, has typically favored qualitative methods (Haddon, 2007).

Within the category of qualitative methods, in-depth interviewing was favored because as Lofland and colleagues argue "intensive interviewing (some times combined with limited observation) may be the most felicitous and possibly the only way to proceed" when the object of study is transsituational, that is, when it is not tied to any specific context or situation (Lofland, Snow, Anderson, & Lofland, 2006, p. 19). This is very much the case for everyday media use, which, rather than being tied to any specific situation, cuts across and is experienced in multiple contexts and areas of life (Helles, 2012). Furthermore, in-depth qualitative interviewing is particularly well suited for use within the methodological framework of grounded theory (Charmaz, 2003, p. 312)—which I will present next—because both are "open-ended yet directed, shaped yet emergent, paced yet unrestricted" (Charmaz, 2006, p. 28).

3.1.2 Choosing grounded theory. Grounded theory is an inductive methodology for qualitative data generation and analysis.[12] The originators of the methodology were Glaser and Strauss, who with their seminal book "The Discovery of Grounded Theory" in 1967 sought to legitimize the use of inductive and interpretive qualitative methods in the predominantly positivist and quantitative-oriented field of sociology of the time (Charmaz, 2006; Glaser & Strauss, 2008; K. B. Jensen, 2011). Since its inception, grounded theory has found widespread use and, having been taken up by several successive generations of researchers, today exists in several distinct but interrelated versions (for an overview, see Birks & Mills, 2011). Indeed, according to Denzin, grounded theory has become "the most widely used qualitative interpretive framework in the social sciences today" (Denzin, 1994, p. 508).

The choice of grounded theory as the guiding methodological framework in this dissertation was motivated by a need for an inductive qualitative approach that would emphasize emergence of analytic categories from data but at the same provide guidance and structure to the research process. Grounded theory is a coherent and well-established approach to qualitative data analysis that matches this need exceptionally well as it offers the analyst a widely recognized vocabulary as well as a set of tried-and-tested practical guidelines for the process of generating and analyzing qualitative data. Furthermore, the

[12] Grounded theory is mainly associated with the collection and analysis of qualitative data but has also been applied in the context of quantitative data analysis (Glaser & Strauss, 2008; Glaser, 2008).

methodology is flexible enough that it may "be utilized by almost any social science, including communication" (Lindlof & Taylor, 2011, p. 250).

3.1.3 A moderately constructivist approach to grounded theory. Broadly, the field of grounded theory can be said to consist of two main methodological schools of thought differentiated most significantly by their epistemologies; one has been referred to as "objectivist" and the other "constructivist" (Annells, 1996; Charmaz, 2006). In what is necessarily a simplified presentation, the objectivist approach can be said to consider empirical materials such as interview statements as reflecting "facts" about the world "out there" and theory as a matter to be "discovered" by the researcher. The constructivist approach on the other hand can be said to posit that "knowledge" is always produced in a local context with a specific purpose and should not—indeed cannot—be viewed independently from this context. Furthermore, theory in a constructivist point of view is not a representation or explanation of "facts" but rather one meaningful narrative out of many possible narratives (Charmaz, 2003, 2006).

The work presented in this dissertation follows Charmaz' constructivist version of grounded theory. This is primarily because the author of this dissertation agrees with the observation that interview data are never objective but are shaped by subjects in interaction. It is, however, also because Charmaz' version of grounded theory, to the author of this dissertation, is the clearest in its presentation and most straightforward in its methods and analytic procedures. Consequently, it avoids some of the unnecessarily complex jargon and "increasingly cumbersome procedures" that have characterized the work of some proponents of grounded theory (K. B. Jensen, 2003, p. 248).

While the dissertation subscribes to a constructivist approach to grounded theory, it does so with certain reservations. The main reservation concerns the constructivist epistemology and the "localism" such a view might entail—as evidenced when Charmaz, for instance, states that "[i]nterview stories do not reproduce prior realities" (2006, p. 27). Although it is clear that interview data are influenced by the context of their generation, taking a constructivist perspective to its extreme would mean seeing this data as a product of—and thus inextricably tied to—the local situation. Data in this view thus cannot be assumed to correspond with any external reality beyond the situation in which they were generated (Alvesson, 2001, 2011). This, of course, would be problematic. As Lindlof and Taylor argue, the ultimate purpose of the research interview is referential, that is, we conduct interviews to learn something about the world. Indeed, "[i]f the most we could say about

interviews is that they shed light on the situation of being interviewed, then most of them would be of dubious—if not worthless—research value" (Lindlof & Taylor, 2011, p. 173).

A pragmatic solution to the problem of on the one hand studying "what is going on" in a given field and on the other hand being aware that the interview is a social arena and not a simple conduit for obtaining unbiased information, according to Alvesson, is "taking localism seriously—but not too seriously" (2011, p. 39). Alvesson suggests that as an "antidote to [realist/objectivist] naivety" (Alvesson, 2011, p. 75) one should critically examine the interview data to assess if it is better understood as something *other than*[13] a representation of an external reality beyond the situation before assuming that it does indeed reflect such a reality. Is an utterance from a female high school student complaining that boys wont leave her alone but keep calling and inviting her to parties in the weekends, for instance, best understood as a representation of a "real" experience or as an act of self-presentational identity work? If such a statement is better understood as identity work than as reflecting a "real" experience, then it should not be taken as evidence for this "reality". It may still, of course, be taken as evidence for something else—in the example perhaps as indicating the importance of romantic relationships in youth.

As such, the dissertation combines Charmaz' (2003, 2006) constructivist version of grounded theory with Alvesson's "reflexive pragmatist" approach to the research interview (Alvesson, 2011), arriving at a moderately constructivist approach to grounded theory.

3.1.4 Application of grounded theory in the dissertation. The various texts on grounded theory stress different methods and procedures as central to the methodology. In an summary of the field, Charmaz finds that all versions of grounded theory include the following set of strategies, which have also been applied in the present study:

> "a) simultaneous data collection and analysis, b) pursuit of emerging themes through early data analysis, c) discovery of basic social processes within the data, d) inductive construction of abstract categories that explain and synthesize these processes, e) sampling to refine the categories through comparative processes, and f) integration of categories into a theoretical framework that specifies causes, conditions, and consequences of the studied processes" (Charmaz, 2003, p. 313).

[13] Alvesson suggests that in general eight alternative readings of the interview situation (or "metaphors") may be used to "test" the interview data against. According to these metaphors, the interview data—beyond corresponding to reality—can be understood as 1) local accomplishment, 2) establishing and perpetuating a storyline, 3) identity work, 4) cultural script application, 5) moral storytelling, 6) political action, 7) construction work, 8) a play of the powers of discourse (for a detailed discussion of these metaphors, see Alvesson, 2001, 2011).

While these six general strategies have been adhered to in the present study, their use has been implicit in the practical execution of the research, rather than occurring in discrete "steps". In the present research three specific grounded theory procedures have been the most central—theoretical sampling, coding, and diagramming. The six strategies above have informed the conduct of the research—indeed have been implicit in it—as it was carried out using these three procedures. In what follows I will present each of these procedures and their practical application in the empirical work.

3.1.4.1 A note on using the Atlas.ti software for qualitative data analysis. Before proceeding, it should be mentioned that the following sections will present some quite specific examples of coding drawn from my analysis of the data. For this coding, I have been using the computer assisted qualitative data analysis software (CAQDAS) Atlas.ti versions 6.2 and 7. Figure 1 shows the main window of Atlas.ti version 7, which contains the core functionality of the software.

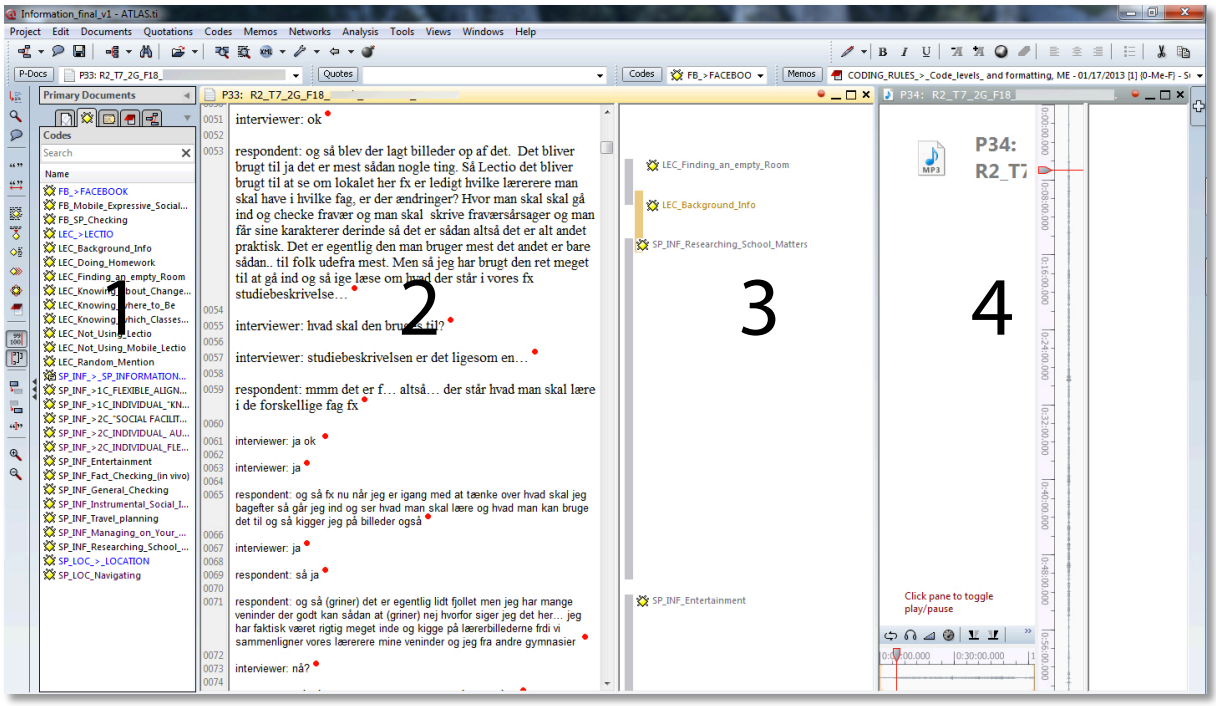

Figure 1: Main window of Atlas.ti, v.7.

In figure 1, labels ("codes") have been attached to segments of a transcribed interview (2), describing their content; these codes are visible as vertical colored bars that extend for the length of the coded segment (3). Once a code has been created and applied, it is placed in the code list (1) for further re-use in similarly themed sections of the current interview or other

interviews. The interview transcription, further, is linked with the audio recording of the interview from which the transcription was made (4). This means that the original audio recording can be revisited as needed during the analysis, for instance to assess the accuracy of the transcription.

Atlas.ti allows for both simple and very complex analysis. In this compilation, Atlas.ti has been used mainly for its core purpose, as a sort of database over transcripts and quotations and as a tool for working with data and thinking about them in a structured way. The main benefit of using a CAQDAS solution such as Atlas.ti is that it facilitates a systematic approach to the coding and analysis process that makes it easy to move between different levels of analysis. First and foremost, the possibility of keeping interview transcripts linked with the original audio files in Atlas.ti has meant that the analyst has been able to move freely from the highest-level analytic concepts—through individual instances of coded data—to the most fundamental representation of the data as audio. Using a CAQDAS solution thus facilitates both detailed and abstract analysis of the emerging categories while, crucially, retaining their contextual embeddedness. This has helped ensure the groundedness of the analysis in data and serves to counter the criticism leveled towards grounded theory that "the analytical procedures tend to cut off social events from their context, as each event is analyzed, reanalyzed, and condensed in increasingly abstract categories" (K. B. Jensen, 2011, p. 278). Overall, using Atlas.ti has lent structure, stringency, efficiency, and transparency to the analytic process (as mentioned also by Corbin & Strauss, 2008, p. xi). The pragmatic aspects of coding using Atlas.ti have been informed by the methods suggested by Friese (2012) who also provides an excellent general introduction to the software.

The sections on grounded theory coding and diagramming below will reflect my use of Atlas.ti and will both serve as a presentation of the abstract concept of coding in grounded theory (which includes diagramming) and as a summary of the concrete coding work applied in the research.

3.1.4.2 Theoretical sampling. Theoretical sampling is an iterative process of directing data collection for the purpose of "saturating" categories, which in practical terms means to collect data until the specific categories have been sufficiently illuminated and new cases do not offer new insights (Charmaz, 2006, p. 113). When conducting a grounded theory study, the data analysis begins early in the process and before data collection has been completed. After conducting an initial round of respondent sampling and data collection, the analyst engages with the empirical data and in this process certain categories or themes emerge

inductively. Since new insights and knowledge is generated in the process of analysis, new questions and areas of interest also arise that were not covered during the initial data collection and need to be addressed in subsequent data collection. Where the initial sample of respondents provided useful data for the early and general stages of analysis, later stage analysis and category saturation of a more specific nature may be better facilitated by sampling other—e.g. more specific—types of respondents. The analyst then returns to the field with the aim of collecting further data to flesh out the emerging categories, sampling individuals that are most likely to provide information that is directly relevant to saturating the categories. This process of sampling respondents to saturate emergent categories is what is understood by theoretical sampling (Charmaz, 2006, p. 96ff). In the words of Charmaz, "[i]nitial sampling is where you start, whereas theoretical sampling directs you where to go" (Charmaz, 2006, p. 100). As evidenced by the above, data collection and analysis in grounded theory thus are concurrent and interdependent.

In the present study, sampling occurred in three phases.[14] 1) In the pilot phase, two focus groups with a total of 10 Danish high school students and two—partly qualitative—surveys with (391 and 338) students at the IT University of Copenhagen were conducted in order to approach the subject area and acquire a tentative understanding of what was "going on" with the adoption and use of smartphones. This helped establish early categories as well as phase out some that, while interesting to the researcher, were of little importance in the lives of the the respondents. 2) The first round of (non-pilot) interviews was conducted with 12 users and 3 non-users of smartphones as both perspectives had proven interesting in the surveys and pilot groups. Although this strategy of interviewing both users and non-users generated useful and interesting data, the first round of interviews also showed that in order to focus the research, and to better be able to saturate the emergent categories pertaining to the use of smartphones, the non-use aspect should be left out in further interviews. 3) The second round of interviews for this reason was conducted with 16 smartphone users. Furthermore, it became a requirement that these respondents were also users of the mobile internet and mobile Facebook to ensure that these aspects could be covered sufficiently.

In addition to sampling increasingly specific profiles for the purpose of saturating categories, the interview guide also changed in the course of the interviews. Starting out with broad topics, the manuscript gradually became narrower as it grew increasingly focused on saturating certain less developed categories, as some categories were saturated, and as others

[14] The sampling strategy for the interviews is described in greater detail under method below.

were phased out. This meant that given a series of interviews, the later interviews in the series would explore new aspects and add new dimensions to findings from the earlier interviews.

3.1.4.3 Iterative coding. The practice of coding data is central to grounded theory and various "recipes" exist for how one should go about doing so (Birks & Mills, 2011; Charmaz, 2006; Corbin & Strauss, 2008; Glaser & Strauss, 2008). Charmaz presents a relatively straightforward approach where grounded theory coding can be said to consist of two main phases

> "1) an initial phase involving naming each word, line, or segment of data followed by 2) a focused selective phase that uses the most significant or frequent initial codes to sort, synthesize, integrate, and organize large amounts of data" (Charmaz, 2006, p. 46)

To elaborate on this definition, labels, in a first round of initial coding, are attached to interview segments that in various ways speak to the research question in an effort to define what the data contains. At this point the coding is predominantly descriptive (see Saldaña, 2009). Having thus built up a lengthy list of diverse codes that have been applied to segments of data, the analysis proceeds into focused coding. Using "constant comparisons" (Glaser & Strauss, 2008, p. 101), codes are compared with other codes for similarities and differences as well as with instances of data that might indicate the need for code modification. Some codes turn out to be similar and are therefore merged. Others are split as the data segments they are used to label turn out to be significantly different in some way. In this process, some codes that have "overriding significance" develop into analytic categories—that is, into emerging concepts.[15] Other such categories are created by "abstracting common themes and patterns in several codes into an analytic concept" (Charmaz, 2006, p. 186). The researcher then attempts to define the properties of these categories, their dimensions, and their relation to other categories.

I will now exemplify the coding process as it has occurred in the present research using some preliminary codes that were developed for article 3. The concrete example has, however, been constructed to illustrate the process. Starting with initial coding, an example of an initial code could be "SP_INF_>_Checking_bus_schedule".[16] This code would be

[15] The difference between codes and categories can at times be quite vague in the literature of grounded theory. Mainly the distinction between the two concepts seems to be that categories are codes—indeed they can be applied *as* codes—that we care especially about for some reason and that we want to examine analytically.
[16] SP_INF is short for "smartphones, informational use" and _>_ is a way on controlling the appearance of the code in Atlas.ti.

attached to all instances in the data where the practice of looking up a bus schedule on the smartphone is mentioned.

As analysis progresses to focused coding, "SP_INF_>_Checking_bus_schedule" is compared with other instances of data. Upon reflection, it appears that "SP_INF_>_Checking_bus_schedule" might be considered an expression of a broader category pertaining to the use of smartphones for managing personal mobility. The code for this reason is merged with other codes pertaining to the management of personal movement in space (for instance the use of navigation apps) into a single category "SP_INF_>_Managing_mobility". Now the code has moved from being purely descriptive to focus more abstractly on the process of using information in the planning and management of personal mobility. It has also developed into an interesting category that we want to analyze further.

However, "SP_INF_>_Managing mobility" may be too broad a category because it masks the differences that exist between looking up a bus schedule and using navigation. This could warrant a splitting of the category into more distinct and homogenous codes, for instance "SP_INF_>Checking_bus_schedule" and "SP_INF_>Using_navigation". In this example, we are now back at a relatively descriptive level, but at least we have the option to examine each code, on its own, for its unique properties and dimensions.

However, we still consider both of these codes as expressions of an overall process of managing mobility and want to examine this process. One solution to this problem is to create an abstracted super-category called "SP_INF_>Managing_mobility" and specify that this category contains the two codes (now subcategories) "SP_INF_>Checking_bus_schedule" and "SP_INF_>Using_navigation". Such a specification of the relationship between codes and categories, in the present research, has been performed using diagramming, which I return to below.

At this point in the coding process, we have identified an interesting category—how people manage personal mobility using smartphones—that we can begin to explore the dimensions and properties of while simultaneously having access to specific behaviors captured by the individual codes (or subcategories).

The above illustrates how, using "constant comparative methods" (Glaser & Strauss, 2008, p. 101), codes and categories/concepts have been developed in the present research to gradually and inductively build up coherent understanding of the field of inquiry.

3.1.4.4 Diagramming. Strictly speaking, diagramming is not central to Charmaz' version of grounded theory (see, however, Charmaz, 2006, p. 117ff.). It is, in my view, however, a very helpful tool for keeping an overview of all instances of coded data while operating at increasingly abstract levels of categories/concepts. While initial coding was about breaking the interviews down to their constituent parts, both focused coding and diagramming (which can be seen as a part of focused coding) help recombine these parts into a coherent analysis. In this way, diagramming is reminiscent of the practice of "axial coding" that is prominent in Corbin and Strauss' version of grounded theory (Corbin & Strauss, 2008). When using Atlas.ti for diagramming purposes, the outcome of the process is a systematic representation of all relevant data due to the fact that one may navigate from the diagram directly to categories, codes, and data. Figure 3 shows a simplified version (certain aspects have been omitted) of the analytic display developed for article 3.

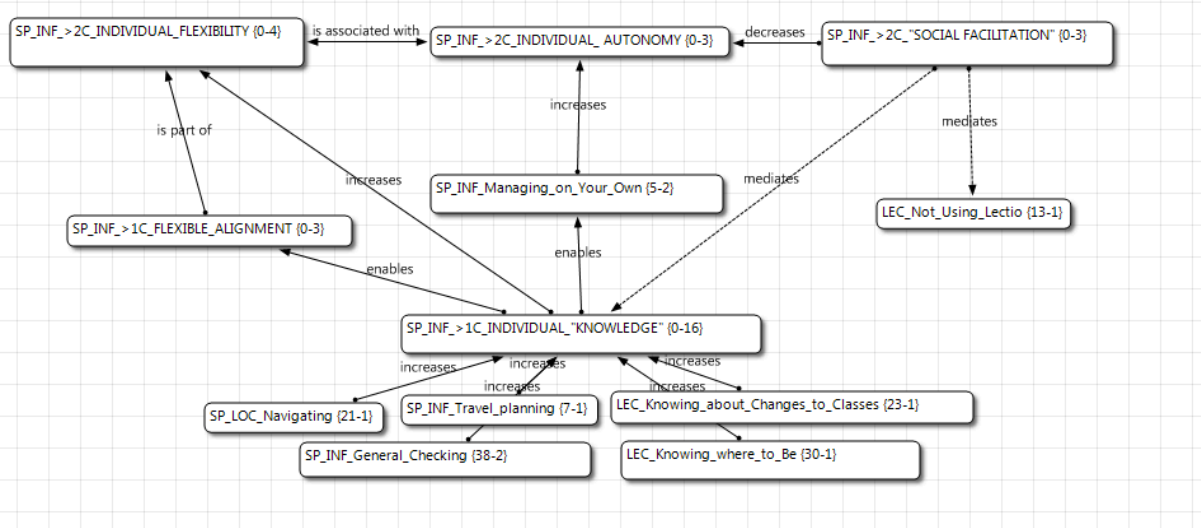

Figure 2: Simplified example of diagramming in Atlas.ti for article 3

While it is important to stress that figure 3 does not represent a full picture of the analysis for article 3, the interpretation that this diagram can be said to express—in broad strokes—is as follows: Specific discussions of certain practices have been labeled in the data and have become codes ("Navigating", "Travel_planning" etc.). Across these practices some common patterns have been abstracted that indicate the higher level category "INDIVIDUAL_KNOWLEDGE" (its status as category is marked by capital letters). The relationship of the codes to this category is that the practices identified by the codes increase

(as shown in the diagram by labeled links) the "knowledge"[17] an individual has in any given situation. This increased access to information, in turn, enables the practice of "FLEXIBLE_ALIGNMENT" (whereby the individual can align his plans, expectations, and behavior to newly received information in a flexible manner[18]) and more generally increases the flexibility of the individual ("INDIVIDUAL_FLEXIBILITY"). Because the use of information on the smartphone handset is predominantly individual, it furthermore increases the autonomy of the individual in interpersonal relationships ("INDIVIDUAL_AUTONOMY"). When an individual conversely does not have access to crucial information on an individual basis, he may instead come to rely on "SOCIAL_FACILITATION"[19] of information access (e.g. asking another—smartphone owning—student which room to be in for class via SMS)—which conversely decreases his autonomy ("INDIVIDUAL_AUTONOMY") in relation to the facilitator.

The analysis conducted through this diagramming, it is important to stress, has not just been a matter of moving blocks around and drawing arrows. There have been constant returns to the interview transcriptions—both filtered by codes (so all text segments with the same code are read as one) and unfiltered (so the coded segments appear in their original context)—as well as to the audio recordings in some cases. The diagramming has, however, helped clarify the evolving understanding of the field of inquiry and the emerging concepts.

3.2 Method

3.2.1 Qualitative interviews with Danish high school students. The main empirical material analyzed in this dissertation consists of 31 individual semi-structured in-depth interviews (Kvale & Brinkmann, 2009) with Danish high school students from three different high schools conducted by the author of this dissertation in November 2011 and in late April and early May 2012.

3.2.1.1 Constructing the sample. In order to gain access to students in a systematized manner, high schools were contacted by phone and subsequently by email containing a formal letter and project description. Schools were explained the relevance and importance of

[17] While "information" seems like a more fitting term for what the individual "has" in any given situation, "knowledge" was chosen because as one female respondent put it, "*I just think that now I've become so crazy about the fact that I can get information so quickly. And get, like, active knowledge [paratviden] like that*" (Sandra, female, age 18).
[18] I refer to article 3 and the summative discussion of the dissertation for a fuller treatment of flexible alignment.
[19] "Social facilitation" was originally part of the analysis for article 3 but was cut out because it was not properly saturated to be developed as a concept. Instead, not having access to information on an individual basis became part of the general discussion of autonomy.

the project and asked for their permission to contact their students and assistance in doing so, as well as providing room for the interviews somewhere at the high school premises. Three schools in central Copenhagen (henceforth school 1), the periphery of the Copenhagen area (school 2), and Central Jutland in the opposite end of Denmark (school 3) kindly agreed to participate in the study.

The three schools were asked to forward a brief invitation electronically to the students that broadly described the purpose of the interviews and offered them a modest fee (a gift certificate for 100 DKK or app. 13 EUR) for their participation. This resulted in 11 replies from interested students from school 1 [T], 26 replies from school 2 [G], and 34 replies from school 3 [H]. While these replies provided a good base on which to begin the construction of the sample, a large majority of the interested students were female. Since it was the ambition of the sampling strategy to cover all three years of high school as well gender approximately equally, additional means of recruitment had to be pursued. First, snowball sampling (K. B. Jensen, 2011, p. 270) was attempted, where students who had agreed to participate in the interviews were asked to tell their friends that they could contact the interviewer if they were interested in participating. This method generated a few extra leads, but again male respondents were hard to recruit through such indirect means. Next, a more direct approach of recruiting in school hallways and classrooms was chosen, and the fee in addition was increased to two movie tickets (representing a value of 150 DKK or app. 20 EUR). Although quite a few male students who were approached declined to participate in the interviews, this method of recruitment proved more efficient for this target group. Table 1 shows the final composition of the sample.

	First year		**Second year**		**Third year**		
High school	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*	Total
School 1 [T]	2	1	1	4	2	0	10
School 2 [G]	3	1	0	3	2	2	11
School 3 [H]	1	3	1	2	2	1	10
Total	6	5	2	9	6	3	31

Table 2: The distribution of students by year of high school and gender.

17 of the respondents were female and 14 were male. Apart from one student aged 21, all respondents were between 16 and 19 years of age. The mean age of the respondents was 17.7 with a standard deviation of 1.1. All but three students owned smartphones and all but one student had Facebook accounts.

3.2.1.2 Preparing the interview guide. In order to prepare for the main interview study, two focus groups were conducted with 5 male and 5 female high school students aged 16-18 (M=16.6, SD=0.7) from school 1[T]. The goal of these focus groups was to explore what was "going on" with the use of smartphones and other mobile media and what topics could fruitfully be included in the main interview study. Various questions and exercises were field tested in order to assess their use for the further study. In the end it was decided that no exercises should be included and that rather than employing an elaborate session guide, an explorative and open guide specifying broad topics of inquiry would be used following Charmaz (2003).

3.2.1.3 Conducting the interviews. It was a demand on the side of the schools that the interviews had to take place in a manner so the students would not miss out on teaching; as such they had to be conducted in the late afternoon or in between classes. It was decided to conduct the interviews at the school premises for the convenience (and willingness to participate) of the students but also because the familiar surroundings provided the respondents with a "protected place" in which to feel confident and at home during the interviews (Lindlof & Taylor, 2011, p. 188). In most cases, schools were able to provide the interviewer with a meeting room, a study room, or an empty classroom in which to conduct the interviews. When this was not possible, the interviews took place in a quiet corner somewhere at the high school premises, or, in one case, at the local library.

3.2.2 Additional empirical data. In addition to the interviews, various other data was also included in the articles of the dissertation. Below, I briefly present this data and its origins.

3.2.2.1 Network traffic data. Article 1, "The Socio-demographics of Texting – an Analysis of Traffic Data" (Ling et al., 2012) is based on analysis of SMS traffic data from the Norwegian network of Telenor in the fourth quarter of 2007. On the basis of anonymized billing records with basic demographic information—such as the gender and age of the user and the volume of traffic associated with a given subscription—394 million SMS exchanges were analyzed. Rich Ling and Pål Roe Sundsøye collected and provided access to this data material.

3.2.2.2 Pilot survey 1. In addition to the above, data from four "pilot" survey-based studies to which the author has contributed has been used in the dissertation. Industry partner "Locationlab" headed by Anders Colding-Jørgensen conducted the first survey in August 2010. The topic of this survey was the uses and perceptions of location-based services and

location sharing in the Danish population. The survey used a representative sample of 1983 Danes between 18-64 recruited from the internet panel of market analyst Userneeds. The role of the author of this dissertation in this survey was mainly to provide critical feedback in the construction of the questionnaire. Findings from this survey were presented in article 4 (Bertel, submitted, p. 10).

3.2.2.3 Pilot surveys 2-4. Three cross sectional online survey studies were conducted by the author and Gitte Stald with students at the IT University of Copenhagen (ITU) in the fall of 2010, spring 2011, and spring 2012. The topic of these surveys—which shared a common set of questions as well as a few questions that that varied—was the use of mobile communication. All full-time students were asked to participate (by email) and the survey yielded response rates of 29% (391, N=1347) in 2010, 26% (338, N=1317) in 2011, and 24% (373, N=1591) in 2012. In 2010, the mean age of the respondents was 25.9 (SD=4.9), in 2011 it was 27 (SD=5.2) and in 2012 it was 26.7 (SD=5.1).

The 2011 survey formed the empirical basis for article 2 (Bertel & Stald, 2013). Results pertaining to the use of location information from all three surveys were presented in article 4 (Bertel, submitted, p. 10) .

4 Research Publications

This section contains the five research publications that make up the main contribution of this dissertation.

Article 1, page 36-54:

Ling, Rich, Troels Fibæk Bertel, and Pål Roe Sundsøy. "The Socio-demographics of Texting: An Analysis of Traffic Data." New Media & Society 14, no. 2 (March 1, 2012): 281–298.

Article 2, page 55-63: [Omitted from print due to copyright restrictions]

Bertel, Troels Fibæk, and Gitte Stald. "From SMS to SNS: The Use of the Internet on the Mobile Phone Among Young Danes." In Mobile Media Practices, Presence and Politics: The Challenge of Being Seamlessly Mobile, edited by Katie Cumiskey and Larissa Hjorth, 198–213. New York: Routledge, 2013.

Article 3, page 64-79:

Bertel, Troels Fibæk. "'It's Like I Trust It So Much I Don't Really Check Where It Is I'm Going Before I Leave' - Informational Uses of Smartphones Among Danish Youth." Mobile Media & Communication 1, no. 3 (2013): 299–313.

Article 4, page 80-112:

Bertel, Troels Fibæk. "'Why Would You Want to Know?': The Reluctant Use of Mobile Location Sharing on Facebook Among Danish Youth." (Manuscript, submitted).

Article 5, page 113-140:

Bertel, Troels Fibæk, and Rich Ling. "'It's Just Not That Exciting Anymore'– The Changing Centrality of SMS in the Everyday Lives of Young Danes." (Manuscript, submitted).

Article 1:

Ling, Rich, Troels Fibæk Bertel, and Pål Roe Sundsøy. “The Socio-demographics of Texting: An Analysis of Traffic Data.” New Media & Society 14, no. 2 (March 1, 2012): 281–298.

Article

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14(2) 281–298

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The socio-demographics of texting: An analysis of traffic data

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Pål Roe Sundsøy
Telenor, Norway

Abstract
Who texts, and with whom do they text? This article examines the use of texting using metered traffic data from a large dataset (nearly 400 million anonymous text messages). We ask: 1) How much do different age groups use mobile phone based texting (SMS)? 2) How wide is the circle of texting partners for different age groups? 3) To what degree are texting relationships characterized by age and gender homophily? We find that texting is hugely popular among teens compared to other age groups. Further, the number of persons with whom people text is quite small. About half of all text messages go to only five other persons. Finally, we find that there is pronounced homophily in terms of age and gender in texting relationships. These findings support previous claims that texting is an important element of teen culture and is an element in the construction of a bounded solidarity.

Keywords
mobile communication, teens, texting

Introduction

The mobile phone fits into a modern mobile life style (Elliott and Urry, 2010), placing individuals in 'perpetual contact' (Katz and Aakhus, 2002) with their network of contacts. Texting[1] is one of the core features of mobile phones and has become a central form

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of mediation with literally trillions of text messages being pecked out on mobile phones around the globe every year (ITU-D, 2010). Texting is used in a variety of situations for simple, circumspect and 'under the radar' communication. It is used to coordinate interaction, to send and receive reminders and to maintain social contact (Licoppe, 2004). In short, texting is a highly useful medium for maintaining social relationships and managing everyday life.

While texting has become popular across all age groups, the literature has mostly focused on the importance of the technology in teenage life. It is teens, after all, who in the late 1990s discovered texting and it is this group who made it their own. Indeed, it is well established that texting has become a fixture of youth culture and teen form of mediation (Ling, 2010).

In the literature, teens have been described as the most active texters, but this does not mean that teens are the only users of texting. In general, however, other groups are not as committed to texting as are teen and young adult users (Vincent, 2011: 181). This is particularly true for the elderly who in general have not taken up texting (Ling, 2008a).

These differences in texting behavior among various age groups have been established and explored in the literature. However, much of the previous research into the socio-demographics of texting has been either qualitative research or quantitative research based on relatively small self-report datasets. Rarely has metered data been available on the actual patterns of texting behavior across a broad range of age groups allowing for comparison between them. In this article, we contribute empirical insight into the question of 'Who texts, and with whom do they text?' on the basis of a large dataset consisting of metered traffic data. The use of metered data gives us an important corrective to the more common use of self-report data (Boase and Ling, 2011).

We compare teen texting behavior to the rest of the population of mobile phone users by addressing three main questions: How much do different age groups use mobile phone based texting? How wide is the circle of texting partners for different age groups? To what degree are texting relationships characterized by age and gender homophily?

To answer these questions we examine metered texting traffic data from a sample of nearly 400 million text messages sent and received by anonymous users. The data was extracted from a larger dataset gathered by Telenor (a large GSM operator based in Norway) in the fourth quarter of 2007.

Our data shows that, as suggested by the literature, teens dominate the texting landscape compared to other age groups, in terms of volume. The data confirms that texting is indeed a teen phenomenon. However, the metered data underscores the dimensions of this phenomenon. Further, teens text with more texting partners than do any other age groups and engage in more cross-gender texting than other age groups. Finally there is pronounced age, but not always gender, homophily with very little texting to persons outside of an individual's age group.

These findings taken together support previous work suggesting that texting is a central element of teen culture (Goggin and Crawford, 2011) and that texting is an element in the construction of a bounded solidarity (Ling, 2008b), namely that the mobile phone

as a personal device helps us in the project of developing and maintaining social cohesion particularly in smaller groups.

Literature review

In a surprisingly short time, texting has gained a well-defined position in our social interaction. It appeared on the scene in the early 1990s as a part of the GSM standard (Hillebrand et al., 2010). It languished for a few years until the late 1990s when teens discovered its potential and, in many ways, made it their own. The functions of texting are many and varied. It is frequently used in both instrumental interaction such as coordination of activities (Ling, 2004) and in expressive interaction. Patterns of use are not necessarily uniform across different social groupings: practices of mobile phone use have been found to differ among different age groups as well as between genders (Baron and Campbell, 2010).

Older people in general have been very reluctant to adopt texting (Ling, 2010) and even today are not texting to any noticeable extent. Adults have been found to often use texting for instrumental purposes such as coordinating when to pick up the kids or to remember which groceries to buy at the store (Ling, 2004). In contrast to the above mentioned groups, teens have embraced texting more wholeheartedly. Among teens, texting is used for a variety of purposes and it has achieved a central position in the youth culture (Bolin and Westlund, 2009; Goggin, 2006). Within this culture, to be available via texting is taken for granted (Ling, forthcoming) and in many countries a teen who wishes to follow the ebb and flow of peer interaction needs to master texting. Originally, texting was seen as a low cost way of interacting (Goggin, 2006; Kopomaa, 2005; Ling, 2005; Ling and Haddon, 2008). From there it developed into a forum where teens could develop their own lingo and style (Goggin, 2006; Hård af Segerstad, 2005; Ling, 2004; Skog and Jamtøy, 2002). These are cultural elements which have later been adopted by other groups. Teen infatuation with texting is perhaps not surprising since in many ways texting as a medium is ideally suited for this period of life. Teens have to manage the dual sets of expectations put forth by their peers and their parents. Peer-based interaction is what helps them through the transition from childhood into their adult life situation (Ling, 2009) and yet parents still play an important role in their lives. In this context, texting provides teens with a discrete and continuously available link to their intimate community (Cohen et al., 2007; Ito and Daishuke, 2005; Ling, 2009) while at the same time acting as a 'buffer' to the prying eyes of parents. For example, teens report texting to their parents when the ambient background sound in a phone call would tell their parents that they are at a party (Lenhart et al., 2010). Texting in this way supports teen emancipation and the transition from the sphere of the parents to the peer group (Ling, 2005, 2009; Ling and Yttri, 2006; Oksman and Rautianen, 2003). Texting allows teens to manage independence (Green, 2003). Further, texting allows teens to explore different aspects of romantic relationships (Cohen et al., 2007; Ibahrine, 2008; Lenhart, 2009), pacing their interaction with potential boy/girlfriends (Lenhart et al., 2010). Different types of courting and sexual interaction may also be negotiated (Dietmar, 2005; Döring et al., 2005; Ellwood-Clayton, 2003; Prøitz, 2005). In addition to these important social functions of texting, it is also used as a form of entertainment (Thulin and Vilhelmson,

2008) and a way to fill in time (Johnsen, 2003; Lenhart et al., 2010). In sum, texting is not a peripheral element in teens' lives but rather a central feature in teen culture (Green, 2003; Ito and Daishuke, 2006; Kasesniemi and Rautiainen, 2002).

At a societal level, mobile telephony has been found to be a form of mediation that supports the development and maintenance of social cohesion (Campbell and Kwak, 2007; Igarashi et al., 2005; Ishii, 2006; Ito and Daishuke, 2005; Reid and Reid, 2004; Smoreda and Thomas, 2001) with our nearest sphere of friends and family. Indeed, texting and mobile telephony is used for the creation of bounded solidarity (Gergen, 2008; Ling, 2008b).

Method and data

The material comes from an analysis of 394 million anonymous text exchanges in Q4 2007 from Telenor traffic data in Norway where there is particularly complete data on gender and age.[2] The material includes anonymized billing records that include traffic volume as well as the age and gender of the user. Other demographic variables were not available in the database and thus we were not able to include them in the analysis. In Figure 1 all the messages are examined. In Figure 2 only a subset of people are included, namely only the same-aged individuals sending and receiving texts, that is about 64.8 million texts. Figure 3 is the same material as in Figure 2. The material for Figures 4 and 5 is from another database from the same operator for the third quarter of 2009. This consists of the data for 49,895 anonymous subscribers.

Results

Topographic analysis of texting between age groups

Figure 1 is a topographic chart showing the volume of text messages sent between pairs of texting partners. The age of the sender is mapped on the X-axis while the age of the recipient is mapped on the Z-axis. The volume is mapped on the Y-axis and shows differences in the volume of messages sent between individuals belonging to various age groups. The ages range from 10 to approximately 90 years of age.

The graph shows a distinct pattern with most of the volume of traffic falling on and closely around the 'same-aged' diagonal running from the lower left corner to the upper right corner of the graph. This clearly shows that most of the traffic occurs between similarly aged texting partners and most particularly between same-aged teens. It is clear from the lower left corner of the graph that teens are the most active texters and that they text more with roughly same-aged individuals than any other group. Moving further up the diagonal, another interesting feature is the relatively active texting done by those aged approximately 36–45.

Looking at the data another way, we compared the empirical material given in Figure 1 to the number of texts that a particular age group would generate if each person, regardless of age, generated the same number of texts. If we compare this hypothetical number to the actual number of texts sent by the different age groups, we can see the relative over and under production of texts. This analysis shows that teen to teen texting, and in particular

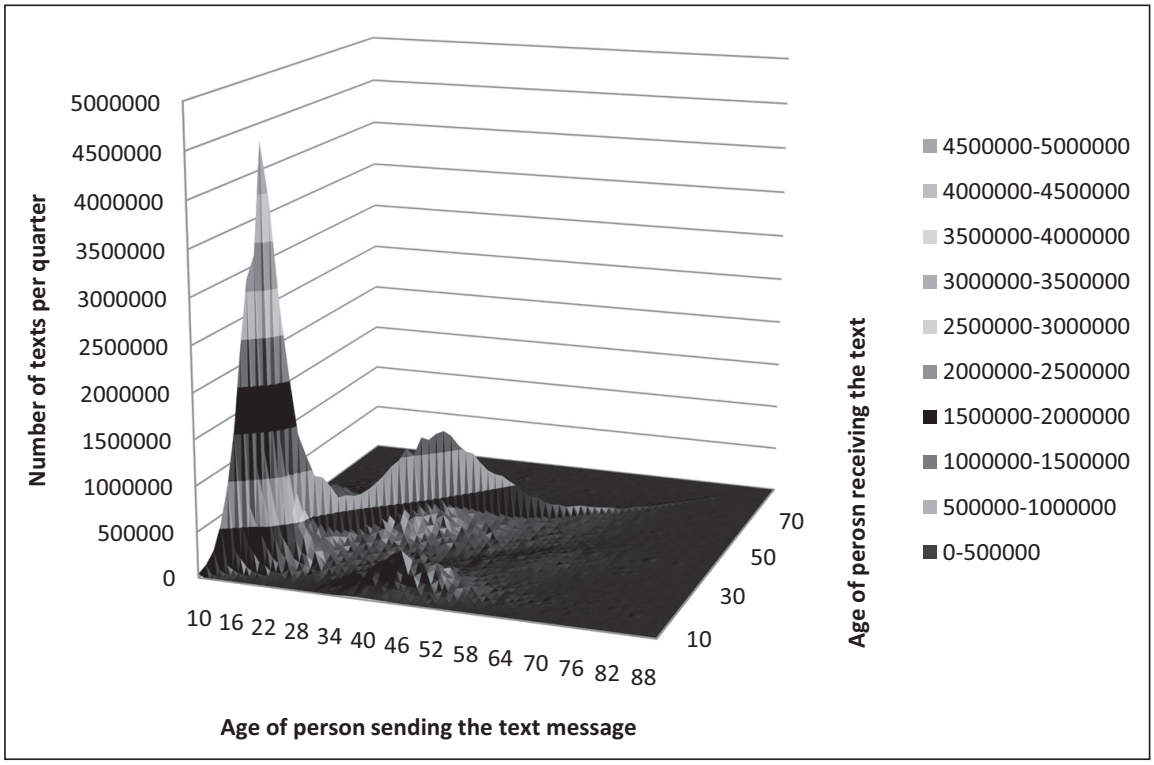

Figure 1. Topographic chart of text messages being sent and received in Norway by age, Q4 2007 (*n* = 394 million text messages).

among same-aged teens, outperforms the 'expected' level of texting. Same-aged persons 16 to 22 years old send and receive on average almost 60 times more texts that one would expect were texting evenly distributed through society. Nineteen year olds specifically generate 80 times more texts than one would expect if every member of society texted equally. By contrast, persons over 70 generate less than 0.01 times the texts that one would expect from this population given the size of that group.

Two distinct and interesting clusters are present on each side of the diagonal – these clusters are comprised of a great number of messages being sent between what appears to be teens and adults aged approximately 37–57. This will be discussed below.

Finally, it is worth noting that there is relatively little texting by those who are over retirement age and that there is very little texting between young adults and younger teens (or indeed between young adults and any other age group). Overall, the chart shows that there is a large degree of age segregation associated with texting among the younger persons.

Cross-gender texting along the great diagonal

The topology of the diagonal in Figure 1 shows that there is a lot of texting activity between same-aged texting partners. Further, it shows that this activity seems to vary among different age groups. This merits a closer examination. First, we will examine the total volume of messages being sent to same-aged texting partners for the different age groups in the dataset.

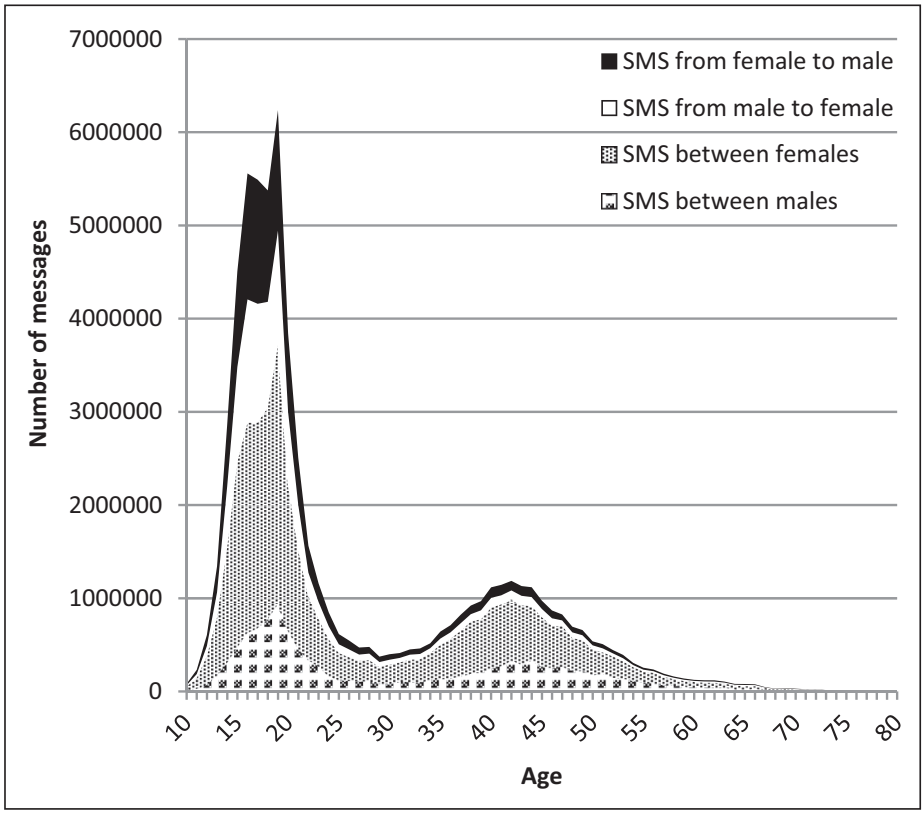

Figure 2. Layer cake diagram of same-gender and cross-gender communication for same-aged individuals. The figure is the great diagonal of Figure 1 sorted by the gender of the sender and receiver of the texts (n = 64.8 million texts).

Communication between same-aged individuals. Figure 1 shows that there is a large element of age-based homophily in texting, i.e. the 'ridge' along the grand diagonal. Figure 2 is a 'layer cake' cross-section of the grand diagonal from Figure 1 showing the volume of same-gender and cross-gender communication occurring between same-aged texting partners. Where Figure 1 was a type of bird's eye view of all the texting activity, Figure 2 shows only the activity of the same-aged individuals, that is where the person sending and receiving the text are both the same age. As in the topographic chart in Figure 1, it is immediately clear in Figure 2 that teens communicate more with same-aged texting partners than do any other age groups in the data material.

From the low volume onset of the graph at age 10, the total number of messages sent to same-aged partners rapidly increases for each succeeding age group until age 17 through 18 where there is some leveling off. The volume of messages then continues to increase until the distribution reaches its overall peak at age 19.

After the peak at age 19, the number of messages to same-aged persons sharply decreases with each succeeding age group until the late 20s reaching a low point at age 29. The decrease in volume of messages through the 20s is quite dramatic – most evidently between age 19 and 25 where the number of messages between same-aged individuals declines by an average of about 30% for each succeeding age group before leveling off. The difference in the number of messages from the peak level to the lowest

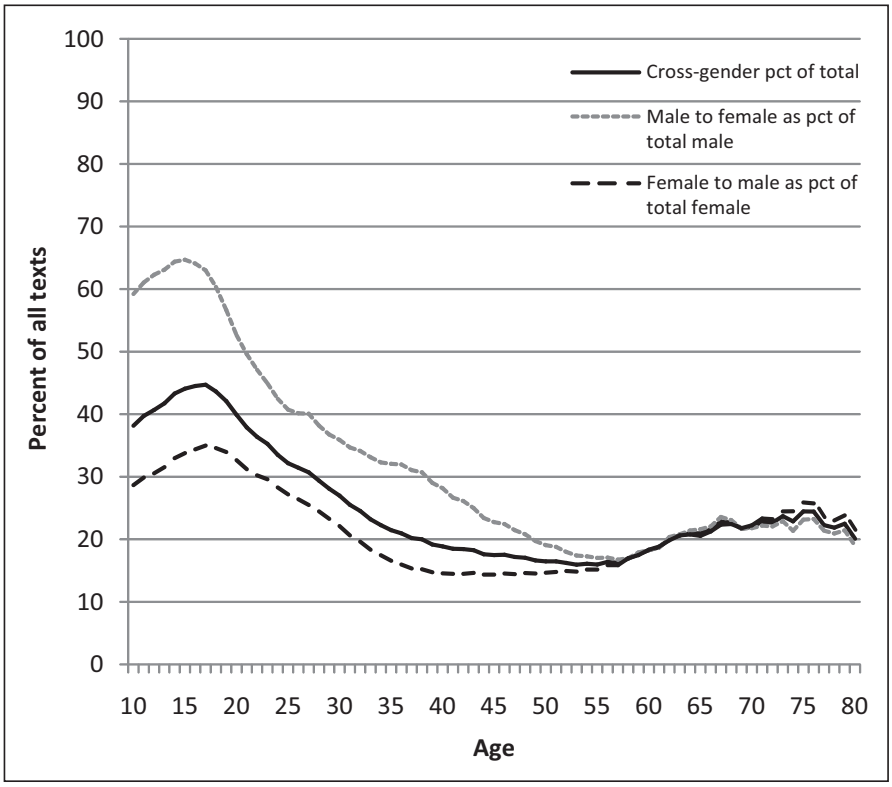

Figure 3. Cross-gender texting in percent by age (7 year running mean).

level is substantial with the number of messages sent by the 29 year olds to other 29 year olds being only about 6% of the number sent between the 19 year olds.

Following the low point for same-aged interactions at age 29, the volume of messages slowly begins to increase, gaining in number until closely before reaching the distribution's secondary, but relatively minor, peak at age 42. This peak – while three times higher than lowest point of the trough – is only approximately 19% of the size of the number of messages sent between the 19 year olds. Again, this underscores the intense activity associated with teen texting, particularly to same-aged peers. From age 42, the volume of messages steadily decreases through the rest of the data shown in the chart.

Cross-gender texting. In addition to the simple number of texts being sent and received, we are also able to see the inter- and intra-gender traffic in Figure 2 as well as in Figure 3. In Figure 2 the volume of same-aged interactions is presented as a total comprised of four layers. The lowest layer is males texting to other males, the next level is females texting to other females, this is followed by males texting to females and finally females texting to males. It is apparent from the material that the largest portion of the messages in Figure 2 are being sent by females to other same-aged females. This remains true across the entire graph. Males in comparison send fewer messages to same-aged males across all age groups. It is also interesting that after the teen/young adult period, there is very little cross-gender texting.

In Figure 3, we show the communication that occurs between same-aged texting partners of opposite gender (males texting to females and females texting to males).

As can be seen in the chart, the proportion of cross-gender texting is greatest around age 16. From this point onward, the general trend is that the proportion of cross-gender communication steadily declines until approximately age 60 where the data becomes too thin for valid analysis. For males the decline is constant from around age 16 to around 55 whereas for females the curve flattens around age 37, after which there is a slight increase in the age groups that follow.

Generally, we find that there is a homophile preference concerning the gender of texting partners in the dataset. This is most pronounced for females where the proportion of cross-gender communication is below 40% for all age groups. For males, the pattern is more nuanced. From age 12 to around age 18, males send more than 60% of their messages to females. As is the case with females, the proportion of males' cross-gender communication also declines with time and gender homophily ensues – but the proportion of cross-gender communication consistently remains higher for males than the females until around age 55. Indeed in some cases the literature has shown that it is not seen as being appropriate for males to spend time texting to other males (Ling et al., 2010).

Texting as a small group phenomenon

Given the findings in the preceding charts that people tend to engage in texting with partners of the same age and, particularly for females, the same gender, it is interesting to ask how many people form the circle of texting contacts and how strong the tendency is toward bounded solidarity (Ling, 2008b). While we of course cannot answer this conclusively, we will present data that may support further analysis and interpretation. Figures 4 and 5 present data on the number of contacts with whom people text.

Figure 4 shows that our number of texting partners is surprisingly small. Indeed, the median number of different texting partners is only about five persons. This indicates that users send the majority of their texts to a select collection of individuals. In terms of sheer volume then, a handful of strong ties take up most of the texting communication. This leaves a small portion of all texts for other, presumably weaker, ties (Granovetter, 1973). The material in the chart also shows that the circle of voice calling partners is smaller than the texting partners. In this case, the median number of calling partners is about three persons. As we will discuss below, this analysis indicates that the mobile phone is primarily a tool used for maintenance of the intimate sphere.

Taking the analysis shown in Figure 4 one step further, we examined the median number of mobile numbers communicated with by age and gender. In this analysis, we see that teens generally have the largest number of texting interlocutors. The median out degree, i.e. the number of different other telephone numbers that a teen sends texts to, is higher for teens and young adults than it is for other age groups. Indeed, for teen girls it is the highest of any other group. Half of all an 18 year old teen girls' texts go to slightly more than six persons. For a same-aged teen boy this is slightly less than 5 other persons. From this point, the median number falls through the rest of the age groups. This distribution in all likelihood reflects the fact that the teen years are often focused on

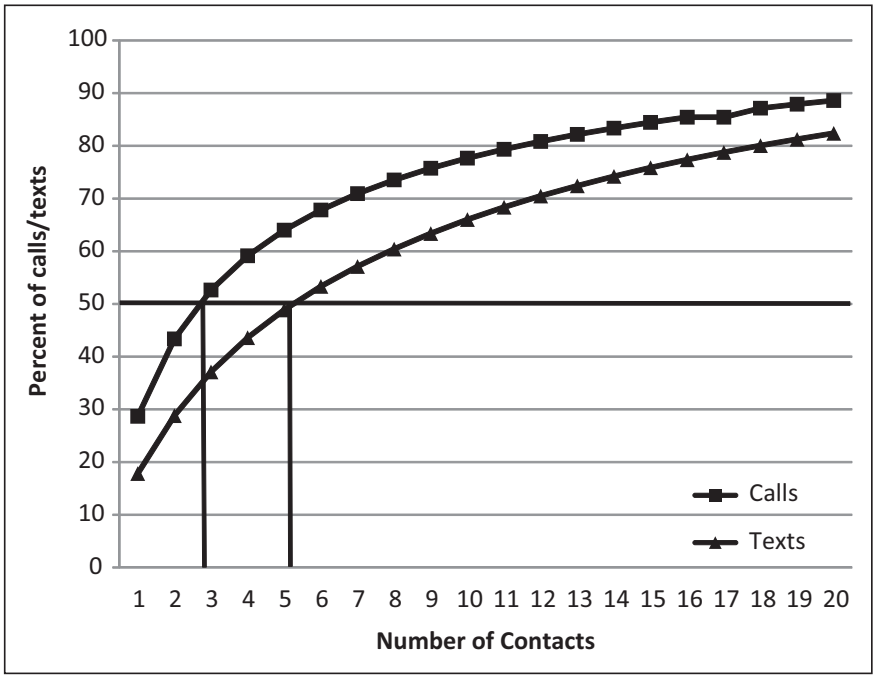

Figure 4. The diffusion of calls and texts by number of contacts. The vertical lines show the number of contacts that account for 50% of all calls (about 3 different contacts) and texts (about 5 different contacts).

cultivating friendships outside the family. Indeed, it is only in this period that friendships are so central. In the period leading up to adolescence and afterwards it is often the family that commands this focus (Rubin, 1985).

Looking at somewhat older persons, after the teen peak, there is a rather long decline in the median number of other persons that are texting partners. For females the decline is approximately a straight line through the remaining age groups. For men there is a somewhat steeper curve that flattens for those between about 33 and the early 50s.

In summary, the material shows that teens are by far the most active texters, that the teen period is the most active period for cross-gender texting and that while the number of different persons we text with is small, it is nonetheless largest for the teens.

Analysis

The teen peak

The data has confirmed that teens are the most intense users of texting. While other studies have shown this, the metered data shows the degree to which this finding obtains. Teens use this medium as they navigate through the straits of adolescence. They rely on each other as they confront the different trials and also celebrate the different victories of adolescence. Friends are the source of social interaction and of information on different daily activities. It is in the teen period that friends are most important. For younger children, friends are often a fixture in daily life, but parents are still central (Goggin and Crawford 2011; Ling and Haddon, 2008). Among adults, our partners and eventually

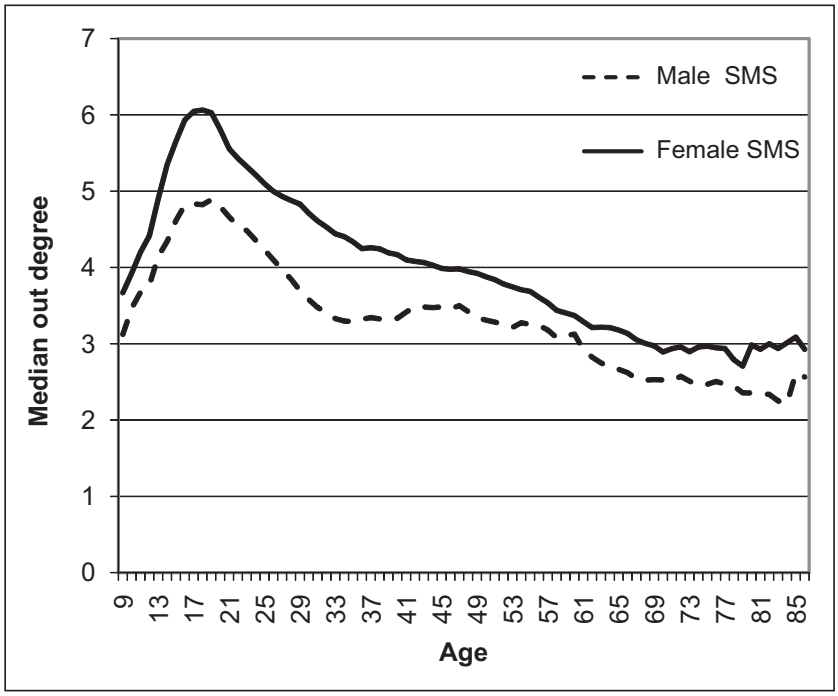

Figure 5. Median number of texting partners by age and gender of the person initiating the texts

children demand our attention. It is the transition from childhood to adulthood, i.e. during adolescence, that interaction with peers is the most important (Rubin, 1985). The material here indicates that, at least in the Norwegian context, it is in the period corresponding to high school and just after, that is around age 18, that texting is most central. The teens in this age group use the most texts and have the largest circle of texting partners. It is also in this period that there is the largest amount of cross-gender texting.

As others have noted, the mobile phone is a useful tool for teens who are, for the first time, trying their hand at more adult forms of social interaction. It gives them a direct channel of communication with peers. They are able to control when and where they communicate. It gives them the opportunity to chat with one another, to report on their locations and to coordinate meeting one another. It helps them to communicate personal matters and to manage school work (Lenhart et al., 2010). While it is possible to engage in important 'conversations' via texting, it is also a channel through which teens can fill in time. They can use texting for chitchat or to exchange the latest news. While a call might be needed for important matters, a text is a simple interaction that does not have to mean that much in the broader sweep of the day. Texting is a 'low maintenance' form of interaction (Ito and Daishuke, 2005). Perhaps because of these reasons, texting has a unique position in the repertoire of teen interaction. Texting is an ambient channel that can be used while other copresent activities are unfolding.

Texting is also taken for granted. There is the expectation among teens that their interlocutors are available via texting. There is the expectation that they will have their mobile phone with them and thus they are never really out of contact (Ling, forthcoming). A friend is always available for textual interaction. Not to be available defies the expectations of the teens.

Where younger persons can expect that their texting partners respond to their messages, this is not a part of older people's interaction. Teens also have specific forms of interaction and a different style of communication in their texts. This same form of address is not retained as they move into young adulthood.

At a broader level, texting is a feature of teen culture (Goggin, 2006) that is also seen in teen 'bedroom culture' particularly in the case of girls, i.e. it is a quasi-private space where it is possible to develop and maintain teen culture (Bovill and Livingstone, 2001; Livingstone, 2007). It is somewhat outside the purview of parents, teachers and other authority figures. Texting is also a space in which teens can develop a lingo and embroider their sense of group cohesion. The sum of all this is the generation of a large number of texts. The data shows that teens indeed are vastly over-represented in their use of texting and that their circle of contacts is larger than that of other groups.

Elderly non-texters

By contrast, the data shows that elderly persons do not text at any appreciable level. There are exceptions to be sure, but in general the elderly neither text to others nor do they receive texts. Why we are seeing this is not clear. Perhaps the design of mobile phones makes it difficult for elderly persons to use them. It might also be that younger persons do not include the elderly in their texting circle (Ling, 2008a). Finally, it may be that the lives of the elderly are not arranged around the expectation that they be available via text messages. The culture of elderly persons in Norway has its characteristic forms of mediation. Indeed this group is perhaps most reliant on the landline telephone (Vaage, 2010). Regardless of the reasons, the material here shows that elderly persons for all intents and purposes are not texters.

The young parent trough

The material in Figure 2 indicates that the young adults send far fewer texts than do the teens. If texting is so clearly functional for teens, why is there such a dramatic drop in use in the older age groups?

First, it is worth noting that the drop in texting is not a cohort effect. Evidence points to the idea that life phase, more than cohort membership lies behind the drop in texting. The young adults in Figure 2 were, in their time, the first generation of teens to use texting. Time series analysis that has followed pre-teens into their teens and has also followed cohorts of teens into the young adult phase of life has shown that while the young adults described in Figures 1 and 2 text at moderate levels, their position as the most active texters has declined since the time that they were teens (Helles, 2009; Ling, 2010). The time series data in the work of Helles and Ling shows that teens only carry texting with them to a certain degree as they move out of the teen phase of life. The latter study covered seven years of data and allowed analysis of pre-teens moving into the teen phase as well as teens moving into the young-adult phase. It shows that the proportion (not the absolute number) of text messages sent by different age groups stays stable over time. Indeed there seems to be a 'standing wave' of use associated with older teens and those in their early 20s.

The material in Figure 5 also shows that the circle of texting partners is smaller for this group. One explanation may be found in the increased routinization in daily life of the young adults. To the degree that texting is a proxy for social interaction, research has shown that people who are in more routinized periods of their lives have a more limited social radius (Fischer, 1982). For people who face the quotidian structural elements of jobs, careers, childcare and the mundane constraints of daily life, social interaction has a place, but it often has to take a position behind more pressing activities. This can be seen in the time use analysis of Norwegians (Kitterød, 2002). The demands of a career can place interaction with the peer group into a secondary position. Childcare and the logistics of having small children perhaps take the focus away from same-aged peer interaction. The nadir in texting (approximately age 29) maps onto the period in life where females – and presumably their approximately same-aged partners – experience having their first children in Norway (SSB, 2009). While the arrival of children doubtlessly increases the communication between the partners for various types of coordination, the sheer pressure associated with caring for the child means that there is less time for social interaction.

Norwegian statistics associated with time use show that those adults who have infants and small children in the home apportion the largest amount of time to care giving. They report using nine times as much time for this activity when compared to those who have older children (SSB, 2000). By contrast, among teens there is a relatively open time budget for personal activities and social interaction. However, as individuals move from that phase of life towards parenthood, the dimensions of social interaction change. This change is reflected in their use of texting. As social life is replaced by family life, the stream of texts also becomes constrained.

This interpretation finds additional support in studies conducted by Licoppe and Smoreda in the late 1990s in a French context (Haddon, 2004). Here, changes in the use of the landline phone over the life course were explored. Key findings were that as young people formed couples, there was an increase of calls between the couple but calls to friends of the two people before they formed a couple decreased by half. Having a young baby also affected phone use leading 'to a reduction of calls overall and a reduction in the number of people called' (Haddon, 2004: 126).

Another issue that may be at work here is that as we move into more adult phases of life, other forms of mediation become more important. Many teens use email, but it is not their primary form of communication (Vaage, 2010). By contrast, business and work life is often carried out in email as opposed to texting.

Cross-gender texting

Another interesting feature of Figures 2 and 3 is the transition in cross-gender texting that accompanies the young parent trough. The material shows that for same-aged teens slightly less than half of the texts being sent and received are from a same-aged person of the opposite gender. For 16 year olds these make up almost half of all texts. This compares with 24% for people in their early 30s. For those over 35, this falls well below 20% of all texts. That is, after the teen/young adult period, there is relatively little cross-gender texting among same-aged individuals.

Some of this may be due to people 'not being on the market' in the same way. As partnered relationships become sorted out, there is not the same pressure to interact with people of the opposite gender. Rather there can be a retrenchment associated with same-gender contacts. This is seemingly reflected in the material shown here.

The middle-aged 'bump'

The data in Figure 2 shows an interesting bump in females texting to other same aged females around the age of 45. This is, in some ways, the most mysterious of the features of the figure. Some of this may be adult females recapturing their social networks after children have become more independent.

Another explanation has been suggested, and indeed tested, by Rasmus Helles (2009). The rise in traffic activity seen here may, to some degree, actually be teens who are using the subscriptions of their parents. Teens under 18 cannot sign a subscription contract and so in some cases this means that their parents may be the owner of the contract according to the data material but that the actual user is a teen with their penchant for texting. Thus, the official subscription is in the name of a 45 year old female, but the person actually using the device is her teen child. Helles modeled the use pattern of teens and then compared that to a similar group of what appears in the data to be adults. His work points to the possibility that it may well be teens who are using their parents' phones. In the context of our material the bump may be pre-adolescents who are 'borrowing' their mothers' phones while they await establishing their own subscription. This clarification is not completely satisfying, however, since it excludes the involvement of the fathers and it also assumes that there is symmetry among teens borrowing the phones of their same-aged mothers.

The bounded group of friends

The final feature of the material is the extremely small number of people with whom we text. When looking at the topographic chart in Figure 1, it is easy to get the impression that some groups are texting to a large number of people. In order for teens, for example, to generate the many millions of texts that are shown there, it is easy to imagine that they are sending a small number of texts to a large number of persons. The data in Figures 4 and 5 shows that it is the opposite. Namely, there are a relatively small number of persons who are receiving a large number of texts. Figure 5 shows that teens have a somewhat larger number of persons with whom they are in contact via texting. Teen girls send about half of their texts to six other numbers, their mothers send to about four and their grandmothers three. This is still a relatively small number of persons.

It has been found (Ishii, 2006) that this small group of persons often constitutes our closest sphere of friends and family. As noted above, texting gives us continual access to these strong ties. An important function of the mobile phone and texting is that we can send and receive communications during the day to hold one another updated with regards to our daily interactions (Licoppe, 2004).

Conclusion

In this article, we have examined the use of texting based on the actual number of texts being sent and received by customers of Telenor in Norway. Nearly 400 million texts being sent and received were included in the analysis. We have examined this traffic in terms of the age and gender of the senders and the receivers as well as the number of contacts they text with. We presented three questions which guided the analysis.

First, 'How much do different age groups use mobile phone based texting (SMS)?' There are great differences in the volume of texting among different age groups. In terms of sheer volume, texting is a teen phenomenon with the peak being in the late teen years. These findings support previous research showing that texting is a salient feature of teen culture in Norway. This allows us to assert that there is a form of symbiosis between texting and teen culture. Texting is a way for teens to keep in touch and to cultivate different types of age-bound expression without disturbing other copresent individuals such as teachers and parents. It is a venue where teens can flirt and where they can confer with confidants. It fits well into the teen life phase where the peer group feels an intense need to be in touch, but is still in many cases living with their parents. Almost immediately following the teenage years, texting volume drops quickly and those who are past their mid-20s have dramatically reduced the volume of texting. It is not really news that teens text a lot and this metered data confirms the studies based on self-report data.

Second, the question 'How wide is the circle of texting partners for different age groups?' examined the breadth of the texting circle. The results show that most texting goes to relatively few contacts. This supports the idea that texting is mostly a small group phenomenon. Generally, our number of texting partners is surprisingly small with half of the texts going to about five persons. There is, of course, a long tail of other contacts, but the core of texting partners is a small group. For teens, the median number of contacts they text with is higher than for other age groups.

Finally, answering question three 'To what degree are texting relationships characterized by age and gender homophily?' there is a strong tendency for persons to text with same-aged interlocutors. Particularly when considering teens, only a small number of texts are sent to and received by persons who are of a different age (with the exception of some communication taking place between teens and what appears to be their parents). Further, there is a strong tendency to text with partners of the same gender – particularly for females. Aside from this, the material here shows that, at least in Norway, teen-to-teen texting is the dominant use of this mediation form. No other group sends and receives anywhere near the number of texts that teens and young adults do. There is very little traffic outside this age group.

This analysis has several limitations. First, it is based on data collected in Norway. This is a small but very affluent corner of the world. Mobile phone ownership is nearly universal and the country has a long tradition of use. The findings might not scale to other countries or other locations. Second, this article examines primarily texting and does not place it into the larger context of multi-modal communication. Third, this is largely an analysis of traffic data. The links between the traffic data and the demographic material can be somewhat problematic. For example, the age of the user is most often, but not always, correctly registered in the database. This can result in some incorrect

analysis. Finally, there is no attitudinal material in the database. This means that the discussion linking the traffic information with specific motivations is, to some degree, speculation.

The analysis here has implications for further research. There are two main threads, which are the role of texting in teen culture and the construction of bounded solidarity. First, there is a need to better understand how texting has affected the process of being a teen and how it plays into parenting and the educational system. Since it is such a strong element in daily life, we need to know if texting and the peer group bonding afforded by the mediation form are coming at the expense of other points in the lives of teens. On the whole, it is probably good that teens have access to friends and are able to socialize in a variety of ways. It is a place where teens can do traditional 'teen' things like develop a special argot, work out the dynamics of dating or help one another with school. In short, texting is one of the places that teen culture is being played out. However, this might also mean that it is a forum that can steal attention away from education or the efforts of parents to guide their children. It is also a forum where there can be mischief and wrongdoing. Just as teens can use texting to organize a charity car wash for orphans in Haiti, they can use it to organize a beer party at the home of a friend whose parents are away for the weekend or to bully a classmate. These issues are not possible to trace in this data. They are nonetheless important questions associated with the rise of texting.

The second general question focuses on how texting and more generally mobile communication affects the balance between cultivation of close ties vs. those that are more remote. The material here shows that the circle of texting 'friends' is remarkably small. This suggests that the mobile phone is an instrument of the intimate sphere. It gives us direct access to the closest friends and family. However, does it do this at the expense of the wider circle of acquaintances? It may be that texting enforces bounded solidarity at the expense of interaction with the weaker links in our social networks.

Notes

1. Texting is also known as the short messaging system or SMS.
2. In many countries the age and the gender is not noted when a person subscribes. For example, in those markets where pre-paid subscriptions are the most common with only 5–10% of the customers using post-paid subscriptions there is almost no demographic material in the database. Thus, we are limited by data access problems. For the data used here, it is important to note that the identity of the sender and receiver is not part of the dataset nor is the content of the text message, only the information that a text was sent between two individuals. There is a proxy identity, but there is not a corresponding key that would allow the re-identification of the individuals involved. With regards to the age of the data, we have done smaller, less systematic examinations of more recent data from 2010 and the pattern of teen dominant texting is still in evidence.

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"It's like I trust it so much that I don't really check where it is I'm going before I leave": Informational uses of smartphones among Danish youth

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Abstract
This article examines the use of smartphones for instrumental information access and use among Danish youth. Based on 31 individual semistructured interviews with Danish high school students and a grounded theory approach, it finds that instrumental use of information on smartphones has become an integrated and relied on part of everyday lives of these young Danes. Near-ubiquitous access to information is found to have consequences at both individual and social levels. Individually, users are able to look up information irrespective of the time and place and respond and adapt to this information in a rapid and flexible manner: a process the article refers to as "flexible alignment." Further, near-ubiquitous access to information may lead to a more flexible orientation among users, who come to depend on just-in-time (rather than ahead-of-time) access to information in dealing with the contingencies of everyday life. Socially, the article finds that users may become increasingly autonomous vis-à-vis the network of social contacts, as mobile access to information is no longer exclusively available through mediated person-to-person communication but can be accessed individually as well.

Keywords
Cell phones, information technology, mobile communication, mobile Internet, smartphones, youth

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Introduction

From Indian fishermen at sea using mobile calls to acquire information about where to land the day's catch to yield the best profit (Jensen, 2007) to Scandinavian teens micro-coordinating meetings with friends via texting (Ling & Yttri, 1999), the exchange of actionable information was always an important part of mobile communication. With the widespread adoption of smartphones in recent years, the opportunities for access and use of such information on mobile handsets have expanded as basic voice and text communication functionality is complemented by near-ubiquitous access to information in general and Internet-distributed information in particular. This development bears a great potential for influencing how, when, and where users access and utilize such information, which in turn may have wide-ranging social consequences; as Meyrowitz (1985) has suggested and as the history of mobile communication has confirmed, changes in the flows of information associated with the introduction of new media may affect social organization at individual, group, and societal levels. However, to date, little research has studied how the use of smartphones is influencing information use practices and what consequences this may have in the everyday lives of users.

This article examines the use of smartphones for information access and use in the everyday lives of Danish youth, a group who are avid adopters and users of such devices. It asks: How are smartphones used for information access and use among Danish youth, and what are the consequences of this use in their everyday lives?

The article considers the use of smartphones in their capacity as interface to Internet-distributed information. Within this overall frame it selectively focuses on access to and consumption of information that occurs outside of mediated communication directly between individuals; looking up a bus schedule online, for example, is within this focus, while asking a friend via text, mobile email, or mobile Facebook is not. Further, the article's primary interest is in uses of information that are instrumental (or goal-directed) as opposed to expressive (or socially/process-directed). This is not to say that only instrumental use of information is important in the context of smartphones; indeed, mobile access to information is often used for passing time, for entertainment, or for sociability (Bertel & Stald, 2013; Church & Oliver, 2011; Purcell, Entner, & Karnowski, 2010). In the interview data analyzed in this article, however, the instrumental uses of information emerged as a salient and distinct theme and will be analyzed as such in what follows.

Mobile technologies and uses of information

The exchange of instrumental information was always an important part of mobile communication and continues to be so today. Indeed, the cell phone was, like the fixed-line phone before it, initially considered an instrumental device for the business sector (Green, Harper, Murtagh, & Cooper, 2001). Later this view changed as young people in particular appropriated the technology and increasingly used it for expressive purposes as well (Ling, 2004).

With smartphones, the functionality and the opportunities to access information on mobile handsets have greatly increased.[1] The academic literature on this topic, however, is limited. In particular, to date few empirically based studies have been published about the use of smartphones for information access and use in the everyday lives of ordinary

users. Most research of the everyday uses of mobile media has focused on communicative uses of traditional cell phone functionality, particularly texting and voice calls.

A recent and growing mobile communication literature has, however, detailed various dimensions of smartphones and their use (Bertel & Stald, 2013; Goggin, 2011; Hjorth, Burgess, & Richardson, 2012; Watkins, Hjorth, & Koskinen, 2012). The iPhone, in particular, has been the focus of scholarly attention (Goggin, 2009, 2011; Hjorth et al., 2012; Ling & Sundsøy, 2010; Snickars & Vonderau, 2012; West & Mace, 2010). While the use of information is, to some extent, implicit in much of this work, it is most often not considered explicitly or in greater detail.

The use of location information in mobile applications has also received increasing attention in recent years (Gordon & de Souza e Silva, 2011; Wilken, 2012; Wilken & Goggin, 2012). Despite the growing interest in this topic, little research has been published by mobile communication scholars to date (de Souza e Silva, 2013), especially empirically based studies (however see Frith, 2013; Hjorth, 2013; Humphreys, 2008). Further, few published studies have examined the everyday use practices outside of specialized populations such as innovators and early adopters.

The field of human–computer interaction (HCI) has also contributed to the study of the use of information on smartphone handsets. For instance, smartphones have been studied as multifunctional, ubiquitous computing devices (Barkhuus & Polichar, 2011), and the use of mobile information has been studied in connection with the mobile web (Church & Oliver, 2011; Cui & Roto, 2008), locative media (Lindqvist, Cranshaw, Wiese, Hong, & Zimmerman, 2011), and mobile search (Church, Cousin, & Oliver, 2012). Typically, however, such studies have approached the subject from a more technology- or design-oriented perspective, studying, for example, how contextual factors influence use rather than what this use means to users in everyday life and what its consequences are.

This paper, then, fills a gap in the literature by focusing specifically on the use of information on smartphone handsets and the consequences of this use in the lives of users.

Youth and mobile technology

Youth has, as Goggin points out, traditionally been "of intense interest to researchers seeking to understand the nature of mobile communication" (Goggin, 2013, p. 83). A significant motivation for this interest is the fact that this group is often assumed to be particularly early and competent users of new technology. Castells, Fernández-Ardèvol, Qiu, and Sey (2007) for instance, argue that young people may reveal potential uses for technology quicker than other groups, because they are generally more willing to adopt and use new technologies, and because they "use these technologies more frequently, better, and faster" (p. 247).

However, the assumption that being young equals heavy and competent use of technology is not without problems. Clearly, young people are not always the heaviest users of new (or mobile) technologies; in Denmark, mobile email, for instance, is used by 58% of the 20- to 39-year-olds versus 46% of the 16- to 19-year-olds (Statistics Denmark, 2012a). Also, young people are not necessarily a homogenous group as regards access to

technology, individual competencies, or indeed the configurations of the wider contexts of their individual lives (Buckingham, 2008).

Regarding the use of smartphones and the mobile Internet in general, recent statistics show, however, that young people are among the most avid adopters and heaviest users of smartphones in a Danish context. An industry survey found that among the 15- to 19-year-olds 70% owned smartphones in 2012 (Association of Danish Media, 2012). Seventy-eight percent of the 16- to 19-year-olds used the Internet on mobile phones in 2012 (Statistics Denmark, 2012a). In comparison, 50% of all Danish households owned one or more smartphones in 2012 (Statistics Denmark, 2012b), and 55% of the general population between ages 16 and 74 used the Internet on the cell phone in 2012 (Statistics Denmark, 2012c).

Because young people are at the forefront of adoption and use of smartphones and the mobile Internet, studying media use in this group may help us understand current and future use practices as well as potentials and problems associated with the new technology more generally (Hartmann, 2005; Livingstone, 2009).

Method

The study uses a grounded theory approach (Charmaz, 2006) and is based on 31 individual semistructured interviews (Kvale & Brinkmann, 2009) with Danish high school students aged 16–21 ($M = 17.7$, $SD = 1.1$) conducted in two rounds in the fall of 2011 and spring of 2012. Seventeen female and 14 male respondents, approximately evenly spread across high school levels 1–3, were recruited from three schools which were sampled for maximum variation (Jensen, 2011); one school was located in the center of Copenhagen, one in the periphery of the greater Copenhagen area, and one in central Jutland in the opposite end of Denmark. Respondents were interviewed at the school premises in order to ground the interviews in an everyday life context. Aside from aiding memory, this "protected place" (Lindlof & Taylor, 2011, p. 188) ensured that they felt comfortable, confident, and at home during the interview sessions.

Initially the interviews were very explorative and open. Progressively the focus was narrowed as some topics became saturated in line with grounded theory. In the first round of interviews both smartphone users and nonusers were recruited in an effort to diversify the empirical material. In the second round, only smartphone users were interviewed. Analysis was conducted in an iterative coding process where initial and focused coding (Charmaz, 2006) was conducted by a single analyst using the qualitative data analysis software package Atlas.ti.

Uses of information on smartphones in the everyday lives of young Danes

Smartphones and uses of information

Previous research has found that mobile information access is a central motivation for having a smartphone (Barkhuus & Polichar, 2011; Bertel & Stald, 2013). In these studies as well as this one the general opportunity to look up information wherever and whenever

is one of the most appreciated features of the technology. In the interviews some respondents mention using mobile search to "fact check" information and to inform or settle discussions in social contexts, a form of "conversation enhancement" described in previous studies (Cui & Roto, 2008). Others mention checking the weather forecast to decide whether or not to go shopping, looking up schedules for public transportation when needing to catch a bus, or simply using a search engine, typically Google or in school settings sometimes Wikipedia.

Mobile Facebook is also widely used among the respondents. Some describe how they mainly use mobile Facebook in what has been called a "listening" mode (Crawford, 2012), where they follow the interaction without contributing explicitly to it. These respondents describe that they check the Facebook app frequently, scanning for interesting social information, and briefly "listening in" on the ongoing conversation. While the use of mobile Facebook mainly seems to be about following the flow of more expressive types of information for the purpose of entertainment and keeping updated, instrumental uses are also mentioned in the interviews—for instance looking up the details of how to get to some event (e.g., a party) posted on Facebook while en route, as in Andreas' following example.

The use of location information in mobile navigation (for instance Google Maps) is also quite popular among the respondents, and it is clear that to many of them this is a valuable tool in everyday life:

> Interviewer: In which situations is it the most important for you to have a smartphone?
> Andreas: Well, if I'm lost then it is nice to be able to go into Google Maps and then find out where I am and how I get where I'm going. And then also if I'm on my way to some event that started on Facebook, like, "Where is it?" (Andreas, male, age 16)

Like many respondents, Andreas points to navigation as an important functionality on his smartphone. One reason that this functionality is central is the convenience and flexibility it provides; users do not have to look up directions ahead of time, but can depend on accessing the information as needed, "just-in-time" (Rainie & Fox, 2012). Another reason is the security that it affords users; always having location information ready at hand means that the user is never lost (provided that the technology works). This theme of security is well-known from the mobile communication literature, where the opportunity to call for help or assistance was found to be a significant motivation for the adoption of the cell phone (Ling, 2004). With smartphones users retain the opportunity to call or text for help or assistance and, in addition, get the opportunity to look up online accessible information autonomously. The themes of flexibility and autonomy are developed further next.

The aforementioned uses of information are all quite general, and most would likely be found in many smartphone user groups (see for instance Purcell et al., 2010). One practice that is peculiar to the respondents because of their status as high school students is the use of "Lectio," an administration, communication, and information system used by many Danish high schools (Lectio.dk, 2013). Mobile access to Lectio gives the respondents continuous access to an updated, authoritative source of

information (as well as basic communication functionality) that is essential in high school life; personal data and grades, individual schedules, canceled classes, classroom changes, announcements of homework, uploaded assignments, and other documents are all examples of information available through the system. Since some of this information is both necessary in daily life in high school as well as prone to frequent changes, and since students, furthermore, are expected to keep updated with any such changes, mobile access to the Lectio system is central to the respondents.

Having briefly outlined the uses of information that are most salient in the interview material, the remainder of the article will consider the consequences of these uses in everyday life.

Smartphones, information, and flexibility

Mobile communication has always been associated with flexibility, the example par excellence being "micro-coordination," the ability to reschedule and renegotiate meetings and appointments "on-the-fly" using cell phones (Ling, 2004; Ling & Yttri, 1999). In what follows I will argue that smartphones extend the flexibility associated with mobile person-to-person communication into the area of information consumption and use and that this, furthermore, is associated with certain changes in the behavior of users, who increasingly come to depend on accessing Internet-distributed information just in time (rather than ahead of time) in everyday life situations. I will examine some of these changes and their consequences in what follows.

Flexible alignment. One significant consequence of near-ubiquitous Internet access on smartphones is that it affords users the ability to look up online information irrespective of the time and place and allows them to respond and adapt to this information in a rapid and flexible manner.

To exemplify the increased flexibility in information use associated with the smartphone, its use in the often busy morning schedule of high school students is illustrative. To the respondents, mornings are a time when the use of the smartphone for information access is particularly important. Getting ready for school they need to know their schedule to know which books to bring for the day, where to attend the first class, or if classes are canceled and they can make other use of their time:

> I'll go on to lectio.dk and find my school and class. Then I'll check what classes I have and if I have to attend, because sometimes [snaps fingers] they might cancel the class in the middle of the ... as soon as you get out of bed. So there is one rule: You always check your schedule before getting out of bed! (Mohammed, male, age 17)

> It was only after I got it [the smartphone] that I realized how useful it was. It was really nice to be able to check if there were any canceled classes in the morning. Because before I had to turn on the computer. It is slow ... It just took so long to turn it on and off, so there wasn't really time [laughs]. Then you sort of had to hope for the best. There were some classes where I knew there was a tendency that they would be canceled and then I did it [turned the computer on]. But otherwise I just hoped for the best and it happened very few times that they were canceled. (Mette, female, age 18)

What is highlighted by the previous everyday examples from the mornings of high school students is the fact that seemingly minor changes in the patterns of information access have significant consequences for the behavior of users. The smartphone, for instance, provides Mohammed with actionable information about whether or not he needs to get up for school—while remaining in bed. The significance of this may seem small at first glance; Mohammed could easily get out of bed and use his computer to look up the information he needs. Getting out of bed to turn on the computer (and wait for it to boot) before checking his schedule would, however, mean that Mohammed was in fact starting the day despite not needing to. The fact that Mohammed has made checking his school schedule with his smartphone while still in bed a fixed part of his morning ritual, speaks to its importance to him.

Mette similarly describes how, previous to owning a smartphone, she would often not check her schedule for updates in the morning, partly because such changes were relatively rare events, but also because her computer was too slow for her busy morning schedule. To Mette, the ease and convenience with which information can be accessed on her smartphone means that she to a greater extent keeps updated with the school information system and is more likely to be aware of changes and able to respond to them.

From the users' perspective, being connected to information at all times and places in a manner that is easy and quick, then, means that they can access and respond to this information in a more flexible manner than was the case before they had smartphones. This is indicative of what I will refer to as a process of "flexible alignment" facilitated by smartphones and central to their use. Where mobile person-to-person communication allows users to flexibly schedule and reschedule social appointments with others in acts of micro-coordination (Ling & Yttri, 1999), mobile access to information allows users to flexibly align their expectations, plans, and behavior with information on which they have little influence. In the case of Danish high school students, unilateral coordination such as changes to a Facebook event or the reallocation of a classroom provides examples of situations where the user has little agency aside from knowing about and adapting to the situation. The concept and practice of flexible alignment, however, also applies more broadly, for instance to practices such as checking a bus schedule, the weather forecast, or using a navigation application, where the smartphone again allows users to flexibly access information and to adjust their behavior accordingly.

Flexible alignment, then, can be said to complement micro-coordination; the latter considers negotiation between individuals, where the former considers the individual's adaptation to information about phenomena that are not directly negotiable by him or her. Further, both flexible alignment and micro-coordination can be said to be expressions of a more general process of flexible adaptation, whereby mobile interfaces allow users to respond and adapt quickly and flexibly to information in various ways.

A reduced need for accessing information ahead of time. Another significant consequence of near-ubiquitous Internet access is that the general need to retrieve and collect information in expectation of some future event is reduced. Instead, users may depend on their ability to access the information they need, when they need it, on demand and just in time:

> I actually sometimes use it [the smartphone] to do my homework. If my teacher has uploaded documents to Lectio about what we're supposed to read for that class, then sometimes the night or evening before I just think, "I'll just read it on the train." And then I read it on my smartphone. (Michelle, female, age 19)

Michelle here recounts how she is able to use the time she spends on transport to prepare for class. Relying on constant Internet connectivity, she is able to use the "moments between planned activities" (Cui & Roto, 2008, p. 908) and to make the most of her time, filling it up "to the very smallest folds" (Fortunati, 2002, p. 518). Students traveling by public transportation have doubtlessly always used this time to do homework. Previously the time spent traveling would, however, be disconnected from Internet access, and one would have to prepare for that situation by bringing the relevant books, dictionaries, assignments, etcetera. Near-ubiquitous access to information on smartphones eliminates (some of) the need to plan ahead. Rather than printing documents or saving PDFs to her laptop computer the night before (that she could then use during the train ride), Michelle can rely on retrieving the information as needed through the mobile connection.

Similarly, several of the respondents describe how mobile access to the Lectio system eliminates the need for them to check which classroom to go to before arriving in school:

> I can see my schedule and which classroom I'm supposed to be in and which homework I have to do. That's also really cool, I think. How you can arrive in school and then you can see, "Oh, okay. I have to be in room 202 and the class is history" or something like that. (Pipa, female, age 21)

The reason that the ability to look up which classroom to go to is significant for the respondents has to do with the fact that the schools themselves allocate rooms in a quite flexible manner. A student cannot, for example, assume that he or she will always be in the same classroom for a history class, as rooms often vary between classes. Therefore, students must look up their schedule in order to know where a given class is taking place a given day. Although this allocation, according to the respondents, is typically made well in advance, classroom allocations may also change with short notice—such as when a class is moved to a computer lab. This gives further incentive to keep updated with the school information system as is facilitated by the use of smartphones.

Smartphones, information, and autonomy

In what follows I will argue that the individual's increased opportunities to access information on mobile handsets may also have consequences at the social level. Specifically, when in need of actionable information and given a choice, users may prefer to access this information online, independently of the network of social contacts. This is in contrast to previously where mobile-mediated person-to-person communication would often be the primary means of acquiring such information.

Mobile communication, connection, and autonomy. According to relational dialectics theory (Baxter & Montgomery, 1996), the relationship between connection and autonomy in interpersonal relations can be conceptualized as a dialectical tension, where centrifugal and centripetal forces pull in opposite directions in a constant negotiation of the balance

between the two. The "perpetual contact" (Aakhus & Katz, 2002) associated with mobile person-to-person communication has been found to affect this negotiation of connection and autonomy in complex ways. Pettigrew (2009), for instance, argues that text messaging gives the users a degree of control over the communication, which can be seen to increase autonomy, as when it is used for private "under the radar" communication in the presence of others (Ling & Campbell, 2009; Pettigrew, 2009). Castells et al. (2007) describe how by "giving parents the security of a lifeline to their children, wireless phones also give children greater levels of the privacy and independence they crave" (p. 148).

Other researchers conversely point to the fact that while mobile communication among children and teens may support autonomy from parents, the mobile "lifeline" mentioned by Castells et al. (2007) may simultaneously lead to increased connection in terms of surveillance by parents who are always able to check up on their children (Ling, 2007; Ling & Bertel, 2013). While the previous lines illustrate that mobile communication cannot be said to have a single unambiguous "effect" on the connection–autonomy dialectic, overall, Katz argues that "In terms of the autonomy–connectedness dialectic, perpetual contact gives priority to connectedness to the detriment of autonomy" (Katz, 2008, p. 442).

Mobile information, connection, and autonomy. The argument that will be made here, then, is that where the exchange of information through person-to-person communication on mobile handsets may be seen as pulling toward connection in the connection–autonomy dialectic, the use of Internet-based information on smartphones may conversely be said to pull toward autonomy.

Oftentimes, accessing information autonomously may be preferred, simply because it is easier; for instance, it may be easier to check Lectio or some other information system or app on the smartphone than sending a text message, calling, or finding a person to ask:

> Alexander: That thing about the classrooms [being able to look up where to be], that's actually really cool. Because then you don't have to ask and stuff.
> Interviewer: Who would you usually ask?
> Alexander: Someone from my class. It doesn't matter. Someone who's in school. But anyways, I have it as a bookmark here, right. And then I just click it. (Alexander, male, age 19)

Hence, using a shortcut on the smartphone to quickly and easily look up his schedule frees Alexander from having to obtain this information through the network of social contacts. Beyond ease of use, the wider social context is, of course, also a significant influence when choosing how to acquire information using smartphone handsets. Always being the one asking your friends for directions or other information, for instance, may not be a desirable role to occupy:

> I was on my way to a girls' night one time, and I was on my bicycle, and I had got lost. And the others would bully me to death if I called and said I had got lost. Because they'd made bets as to how late I would be, because I would get lost [laughs]. So I just checked Google Maps and found my way there, and I wasn't late. And no one had to know I had got lost. That was really cool! (Nanna, female, age 16)

Nanna in this example gets lost on the way to a girls' night and needs directions. Simply calling one of the other girls attending the event would be an easy way to get help. This would, however, come with a penalty, as Nanna would be teased about being lost. Benign as this teasing would undoubtedly be, Nanna would be reinforcing an undesirable image of not being in control if she called her friends; the other girls are expecting her to get lost, to the point of making bets about it. Using the smartphone to access the information without involving the others in this case is much preferable to Nanna, who manages to find her way on her own and keep her troubles secret.

Taken together, the previous examples show that the constant individualized access to information on smartphone handsets may pull toward autonomy in relationships. Having the opportunity to bypass the network of social contacts for mobile information does not, however, mean that one will always choose to do so. As Ling has argued, mobile communication also serves social functions and helps build social cohesion (Ling, 2008); unlike people, Google Maps does not do small talk or comfort users when they are lost. Taking Ling's point further, the increased autonomy associated with individualized access to information, then, can also be seen as a missed opportunity to socialize.

Research has often emphasized how the introduction of new networked information and communication technologies increases communication (Rainie & Wellman, 2012) and interpersonal connection (Quinn & Oldmeadow, 2013) as well as breaks down situational barriers in so-called "context collapse" (Marwick & Boyd, 2011; Watkins et al., 2012). While these are, indeed, important aspects of the use of new media, Nanna's example underscores the less often discussed point (although see Ito & Okabe, 2005, p. 260; Meyrowitz, 1985, p. 48) that new media may also be used to limit and control communication, to erect barriers, and to separate contexts. As Ling and Campbell (2011) have argued in the context of mobile communication, new media may both bring us together and tear us apart. As such, new media practices, in this case informational uses of smartphones, enter into complex negotiations of relationships, as illustrated here, giving users more choices and opportunities for managing interactions and relations as well as for regulating the connection–autonomy dialectic.

A final point, which is central and yet has not been discussed in the previous lines, is the observation that as users gain independence in the context of relationships, they are simultaneously becoming increasingly dependent on their handsets and the systems and repositories of information to which they provide access. Smartphones, then, may give users greater autonomy in interpersonal relationships, but this may come at the cost of a greater dependency on technology.

Non-use

Based on the previous analysis, it is easy to get the sense that near-ubiquitous access to information through smartphones is an absolute necessity among young Danes, something that is impossible for them to do without. At the time of the interviews, however, there are still many young Danes who do not have a smartphone—24% according to one survey (Aarup, Nielsen, Steenberg, & Andersen, 2012)—and who manage without it:

> There are plenty of people in my class who don't have smartphones, who check it [Lectio] before leaving home and who check it the night before and write it [which classrooms to go to] down and stuff. Or send text messages to those who do have smartphones and say, "Hey, which room are we in?" [laughs]. I think it is just a habit. You get used to it. (Sara, female, age 18)

Sara, herself a smartphone user, in this example describes how some of her classmates do perfectly fine without smartphones by accessing and storing information ahead of time (as opposed to just in time) or by depending on their network of contacts to gain access to the information second hand. This is in a way the mirror side of the previous discussion of flexibility and autonomy. Where individualized access to information through the smartphone may decrease the need for ahead-of-time access to information and increase the autonomy of the user vis-à-vis the network of social contacts, not having this access means that the need to access information ahead of time or through mediated person-to-person communication remains the same. As the majority of young Danes today have smartphones, it is, however, also clear that the status quo is not what it used to be. Rather, what until quite recently used to be the usual way of doing things is being recast as decidedly inconvenient in the light of smartphone ownership; indeed, several of the respondents describe how they have become accustomed to the convenience of constant Internet access in particular and, consequently, would no longer want to do without.

Toward taken-for-grantedness

While the mobile Internet has, as Goggin has pointed out, "been famously slow to materialize" (2011, p. 129), recent years have seen a transformation of mobile Internet access from novelty to mundane and dependable everyday technology. Indeed, when interviewing young Danish smartphone users, it is striking just how ordinary near-ubiquitous Internet access on mobile devices has become to them and how they have come to depend on it:

> I think it can be difficult for people. I mean, I don't understand how people can know that they have to be in a specific classroom if they do not have a smartphone. (Pipa, female, age 21)

> I mean that it's almost like a necessity, right. It's like I trust it so much that I don't really check where it is I'm going before I leave. Then I can just quickly check the travel plan and find out. Like that, right.… So that way I don't do it like I normally would if I did not have the smartphone, right. (Simon, male, age 19)

Pipa, like many of the respondents and as described previously, depends on her smartphone for finding out which classes will be in which classrooms. She has come to rely on this to the point that it is almost incomprehensible to her how others can do without. Simon, too, has come to depend on near-ubiquitous Internet access on his smartphone, which has allowed him a more flexibly structured everyday life. He no longer looks up travel information before leaving the house, but rather trusts his device to supply this information as needed, just in time. Such reliance on and "trust" in the technology suggests that among young Danes smartphones are increasingly becoming taken for granted (Ling, 2012) in their capacity as interface for accessing and using information.

Conclusion

This paper finds that near-ubiquitous, individualized access to Internet-distributed information on smartphones is becoming an integrated and relied-on element in the everyday lives of a sample of young Danish high school students. While Internet access on mobile handsets is arguably best understood as an incremental evolutionary step in the history of mobile and new media rather than a revolutionary one, the technology is found to have significant consequences at both individual and social levels.

At the individual level, constant Internet access affords users the ability to look up online information irrespective of the time and place and allows them to respond and adapt to (new or updated) information in a rapid and flexible manner: a process I have referred to as "flexible alignment." Further, the general need to retrieve and collect information in expectation of some future event is reduced. This may lead to a more flexible orientation, where users come to depend on just-in-time (rather than ahead-of-time) access to information in dealing with the contingencies of everyday life.

At the social level, users may become more autonomous vis-à-vis the network of social contacts as information on demand is no longer exclusively accessible through mediated person-to-person communication, but can be accessed individually as a result of near-ubiquitous Internet access.

While the aforementioned developments are mainly framed in positive terms (in line with the way they are experienced by the respondents), it is clear that there may also be a less positive side to them. If the capacity of individuals to keep updated and flexibly align their behavior with (new or updated) information becomes an expectation or indeed a demand, this might, for instance, promote a "tyranny" of flexibility (see for instance Eriksen, 2001). As users come to rely on individualized access to information, there is also the risk that they may miss out on opportunities to socialize and in various ways become overly dependent on access to external information. At this point in time such considerations remain mostly speculative. They do, however, indicate that the evolving practices, norms, and expectations surrounding mobile access to (and use of) information is a highly relevant and interesting topic for further research.

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Note

1. It should be noted that the adoption of advanced cell phones has been uneven globally. Japan, in particular, has been ahead of the rest of the world in adopting Internet access on cell phones through the use of what some have referred to as "webphones" (Miyata, Boase, Wellman, & Ikeda, 2005). The focus in this article, however, is on the use of current smartphones. For further discussion of what defines a smartphone, see Bertel and Stald (2013) and Watkins et al. (2012). For an overview of earlier mobile communication developments in Japan, see Ito, Okabe, and Matsuda (2005).

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“Why would you want to know?”: The reluctant use of mobile location sharing on Facebook among Danish youth

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Abstract

With the widespread adoption of smartphones and Facebook, mobile users today have an increasing number of ways to communicate about their location; the practice of "checking in", broadcasting one's location to one's network of friends, is one such way. Previous research has indicated that the social sharing of location information in mobile social media may have significant consequences, for instance in the areas of coordination, self-presentation, network presence and social capital. An interview study conducted with 31 "ordinary" young Danish smartphone and Facebook users, however, indicates that the use of location sharing despite being well known, and despite the potential of the technology indicated by previous research, has come to play a relatively minor role in their everyday lives. This article explores in detail and discusses the discrepancy between the existing literature and this empirical finding.

Keywords: smartphones, mobile internet, mobile phones, youth, information technology, location, place

Introduction

Location was always an important part of mobile communication. The question "where are you?" so common in mobile phone conversations illustrates this point clearly. Location information in mobile telephone serves important purposes, for instance defining the context of the interaction, signaling the need to end a call, or forming the basis of micro-coordination (Ling, 2004; Weilenmann, 2003).

With the widespread adoption of smartphones and mobile access to a variety of social platforms, everyday technology users today are gaining more opportunities to communicate about their location. Services such as Facebook and the more specialized Foursquare, for instance, combine location sensitive smartphone terminals and social networking software to allow smartphone users to "check-in" to locations, broadcasting ("sharing") the fact that they are at a given place at a given time to their networks of friends.

Previous research has found such networked locative media (Wilken, 2012) increases the potential for coordination and communication among users (Sutko & de Souza e Silva, 2011). The sharing of location information may, for instance, provide new ways of coordinating meetings as well as facilitating chance encounters with friends and to a lesser degree strangers (Humphreys, 2008b, 2008a). It may play an important part in the identity construction of users (de Souza e Silva & Frith, 2012, 2013; Farman, 2012; Frith, 2013) as well as help them create and maintain social presence in networked media and build social capital (Hjorth & Gu, 2012; Hjorth, Wilken & Gu, 2012; Hjorth, 2013).

In spite of these finding from studies among lead users, an interview study conducted by the author of this article finds that the sharing of location takes up a relative minor role in everyday lives of a sample of ordinary young Danish smartphone and Facebook users (of whom a large majority—approximately 80%—are mobile Facebook users), who use the

functionality infrequently if at all. To these young Danes, the sharing of location on Facebook is a contested practice that is acceptable in some circumstances but often considered trivial and irrelevant if not inappropriate.

Considering the promise of the technology as indicated by previous research, these predominantly indifferent and negative attitudes towards the social sharing of location is puzzling; why have these young Danes not taken up using this technology to any major extent, when others apparently find it so useful?; when the same information is commonly considered relevant in the context of mobile telephony?; when other smartphone functionalities are already moving towards taken-for-grantedness? (Bertel, In Press).

This article explores the above questions by examining the domestication of location sharing in the form of so-called "check-ins" on Facebook among ordinary young Danish smartphone and Facebook users. It asks: What role does location sharing on Facebook as facilitated by smartphones play in the lives of young Danes and how may we understand the discrepancy between the promise of the technology as indicated by the existing literature and the predominantly negative perceptions of the technology indicated by the present study?

Domestication of Media and Technology

The present research draws upon the domestication framework for understanding how technology is appropriated by users. This framework emphasizes that users are active in shaping media technologies, as they fit them into everyday life, making them their own (Haddon, 2003, 2011). Further, the it insists on studying the wider "consumption" of media and technology in everyday life rather than their adoption and use alone. It thus emphasizes a focus on the meaning-making processes associated with media technologies and how they are experienced as well as their display and symbolic value for personal and group identities

(Haddon, 2011; Ling, 2004).

In the present context the approach is used as a framework for understanding how and why a technological push—in this case the introduction of location sharing technology and the encouragement to use that technology to "Share Where You Are" (Facebook.com, 2013)—is being met with reservations by users who are for various reasons assigning it a relatively minor role in everyday media use.

"Checking in" on Facebook

The most common way to encounter social uses of locative media in Denmark is via so-called "check-ins" published on Facebook where most young Danes have a profile (Bucht, Livingstone & Haddon, 2009). Since January 2011, Danish users have been able to "check-in", that is to declare that they are at a given place at a given time, to "places", which are physical locations registered with Facebook (ComON, 2011). In addition to sharing their location with their networked friends, users may augment the check-in by attaching a text message to it, adding a photo or tagging others that are with them.

A set of distinct features characterizes Facebook as a locative medium and venue for sharing location information. First, Facebook is what Sutko and de Souza e Silva (2011) call an "eponymous" (as opposed to "anonymous") locative medium in that users check in using their personal identity.

Second, users are actively communicating their location to others when checking in; this is different from some other services, which continuously track and broadcast the location of users (for instance the "Find My Friends" service by Apple).

Third, unlike some "prescriptive" social software applications such as for instance Foursquare and popular US services BrightKite and Loopt, Facebook comes without a set of

predefined goals or rewards for checking-in. These services were designed around the sharing of location and "encourage particular social behaviors and provide very clear rewards for behaving in the 'right' way" (Marwick, 2009)—for instance by symbolically rewarding users for checking-in to certain locations (with virtual "badges" and other tokens).

Fourth, the sharing of location on Facebook occurs in flows of what Castells has referred to as "mass self-communication". This type of communication is characterized by being "*self-generated in content, self-directed in emission, and self-selected in reception by many who communicate with many*" as well as by being able to reach a mass audience (Castells, 2009: 70). This is in contrast to, for instance, mobile phone conversations where location information is exchanged in communicative dyads.

Previous Studies

Although the literature on locative media in recent years has grown considerably, research approaching locative media from the perspective of mobile communication is limited (de Souza e Silva, 2013). In general, most of the empirical work in the context of locative media has focused on media arts experiments (Sutko & de Souza e Silva, 2011).

Looking specifically at the social sharing of location by ordinary users in mass market "second generation" locative media such as Foursquare and Facebook (Hjorth, 2013), there is a dearth of empirical studies in this area. That is not to say that there has been little academic interest in the sociability potentials of second-generation locative media. Such work, however, has mainly been theoretical, critical reviews, or interpretations of previous empirical work (de Souza e Silva & Frith, 2012; Farman, 2012; Gordon & de Souza e Silva, 2011; Wilken & Goggin, 2012; Wilken, 2012).

Despite these limitations it is possible to identify two general aspects of the social sharing of location that have been of particular interest to researchers in the field and are particularly relevant in the context of the present study; these are the "purpose-driven" and "social-driven" uses of location information (Tang, Lin, Hong, et al., 2010), corresponding in the main to the distinction between coordination and communication.

Purpose-driven Uses of Location Information. Considering the sharing of location information from a coordination perspective, checking-in to a place, according to de Souza & Frith, is a way of saying "Hey, I'm here. Is there anybody around?" (2012: 164), thus indirectly inviting friends to meet up. Such and other practices were studied empirically by Humphreys among early adopters of the location based social network Dodgeball where meeting up with friends was found to be the primary motivation for use (2008b, 2010). Coordination via Dodgeball was found to be particularly useful for groups because group coordination, if conducted for instance via texting, can be quite complex and include a prohibitively long series of exchanges. The mass self-communication flows characteristic of Dodgeball and other (location-based) social networking software, on the other hand, facilitate this process "by *broadcasting* location information among networks of friends and friends of friends" (Humphreys, 2010: 769) eliminating the need for lengthy negotiations between group members.

Social-driven Uses of Location Information. Humphreys work furthermore found that social-driven and identity-oriented uses such as "showing off" and "cataloguing one's life" were also significant motivations for sharing one's location (Humphreys, 2008b). Expanding on this point, de Souza e Silva & Frith in a Goffmanian inspired analysis argue that

> "Location has become an important piece of personal and spatial identity construction. In traditional social networking sites (SNS) people choose to publish pictures and select information to show their friends specific aspects of themselves. Location-based social networks (LBSNs) and location-based mobile games (LBMGs) add another element to the construction of the self: location. By choosing to check in to some places and not others, LBSN participants show their social network some aspects of their lives and not others. Those locations, then, become part of how others infer qualities about them." (de Souza e Silva & Frith, 2012: 163).

The above argument was made in the "prescriptive" media context of LBSN and LBMG which both have the sharing of location as the defining characteristic as discussed earlier. If, however, self-presentation is an important part of the use of location information in services like Foursquare, this is likely to also be the case (perhaps even more so) on Facebook, where a series of studies have found self-presentation to be a central motivation for use (Nadkarni & Hofmann, 2012).

Hjorth & Gu in a study conducted in Shanghai, China, finds that the key motivation for users checking in (to Jiepang, a Chinese equivalent of Foursquare) is "to both see where their friends are and to report on new 'cool' places" (Hjorth & Gu, 2012: 703), in part to show off (Hjorth, Wilken & Gu, 2012: 52).

Such "check-in performances" (Hjorth, 2013: 6) furthermore are found to help users create and maintain a sense of presence in social networks; particular check-ins that are augmented with photos have a special potential for creating presence and strengthening interpersonal bonds (Hjorth, Wilken & Gu, 2012).

An additional motivation for location sharing among the respondents of this study was to record the places they went—as part of "everyday diaritization" (Hjorth, Wilken & Gu, 2012: 52)—and to share this information with their friends in a kind of "networked memorialization" for the benefit of both themselves and others (Hjorth & Gu, 2012: 704; Hjorth, Wilken & Gu, 2012: 51). Shared knowledge, particularly of interesting "meaningful"

places, was found to be an important social capital resource within the participants' social network (Hjorth, Wilken & Gu, 2012: 57).

While the literature is limited, the above studies suggest that social sharing of location may have significant social consequences. It may help users meet up in public spaces and it may become part of the individual's presentation of self. Further, the sharing of location with the network of friends on social network sites may help users create and sustain presence as well as to document their behavior for the benefit of self and others, generating social capital in the process.

Check-in Practices Among Danish Youth

An industry survey conducted by FDB analyse in 2012 found that among 15-34-year-old Danish smartphone and tablet owners, 56% use the check-in function on Facebook, Foursquare or similar services. 5% do so daily; 8% use it one or more times a week; 18% use it one or more times a month; 25% use it less than once a month, and 43% never use the functionality while 1% do not know if they do (Aarup, Nielsen, Steenberg, et al., 2012: 149). While total use is relatively high, it is also predominantly infrequent. This indicates that to most young Danes, the practice of checking-in has not become a routinized part of everyday life.

The survey also probes the motivations for sharing location and finds that 63% of those who check in state that they do so "to show my friends where I am"; 11% do so "to get discounts"; 6% "to enter competitions"; 3% "to play games (earn a badge/mayorship)"; 21% "to leave a message about a place"; 5% do so for "other" unspecified reasons, and 17% state that they "don't know" why they use the function (Aarup, Nielsen, Steenberg, et al., 2012: 165).

The fact that 17% do not know why they use the function is particularly interesting because it suggests that checking-in may in part be something one "just does" from time to time without having a specific reason to do so. We might speculate that some of this is due to novelty and the "because I can!" factor sometimes associated with acquiring new technology (Bertel & Stald, 2013).

An industry survey conducted by Locationlab in the fall of 2010 (and to which the author contributed) explored the uses of location sharing in the Danish population. Using a representative sample of 1983 Danes aged 18-64 (M=42.74, SD=12.42) recruited from an internet panel, this survey found that very few used location sharing applications; Google Latitude was used by 3.6% (72, n=1983); Foursquare was used by 0,7% (13); Gowalla was used by 0,2% (3).[1]

Although practical experience using location based social software was very limited, the respondents had quite negative attitudes towards such practices as measured by a five-point Likert-type scales ranging from "Disagree" (1) to "Agree" (5). In general, the respondents agreed that others knowing about their location "is frightening" (median=4, n=434); they were undecided whether it "is practical" or not (median=3); and they disagreed that it "is nice" ("*hyggeligt*", median=2).

A series of three cross-sectional online survey studies were conducted by Gitte Stald and the author among full time students at the IT University of Copenhagen (ITU) in the fall of 2010, spring 2011, and spring 2012. Email invitations were sent to all full time students and yielded response rates of 29% (N=1347) in 2010, 26% (N=1317) in 2011, and 24%

[1] Facebook had not yet implemented location sharing in Denmark at the time of this survey.

(N=1591) in 2012. Although the results from these surveys are not generalizable to a wider population, given the media and technology oriented educational profile of the ITU and the non-random sampling strategy, they may, however, further nuance the description of media use among young Danes when combined with the above studies. Table 1 summarizes the findings regarding the use of locative media in the three pilot studies.

[INSERT TABLE 1]

Table 1 shows that location sharing via social software is consistently limited. Furthermore, the table shows that the respondents who check-in on Facebook do not do so very often in line with the survey from FDB analyse above; looking at the 2012 figures it is clear that use mainly takes place monthly or less than monthly.

Method

The study was conducted using a grounded theory methodology (Charmaz, 2006) allowing for a flexible and explorative approach to the emergent smartphone phenomenon. In-depth qualitative interviewing was chosen as the method of data collection because the flexibility and control over the construction of the data afforded by this approach fits the analytic strategies of grounded theory particularly well (Charmaz, 2003). 31 individual semi-structured interviews (Kvale & Brinkmann, 2009) were conducted with Danish high school students and these form the empirical basis of the article.

The interviews were conducted in two rounds in October 2011 and in April 2012. The first round of interviews explored use practices broadly on smartphones, mobile phones, and Facebook to understand the role smartphones occupy in the overall communication repertoire

of young Danes. The second round focused more narrowly on the use of smartphones (and services used on smartphones) along the dimensions of information, location, and communication.

17 female respondents and 14 male respondents aged 16-21 (M=17.74, SD=1.15), approximately evenly spread across high school year 1-3, were interviewed. 27 respondent owned smartphones, 30 respondents used Facebook, and 25 respondents used mobile Facebook.

The students were recruited from three different high schools in an effort to diversify the empirical material; one school was located in central Copenhagen, one in the periphery of the Copenhagen area, and one in the central Jutland, in the opposite end of the country. The interviews were conducted at the school premises, providing students a "protected place" (Lindlof & Taylor, 2011) to feel confident and at home during the interviews.

The interviews were transcribed and imported into the computer assisted qualitative data analysis software Atlas.ti 7 where coding was conducted by a single analyst in an iterative coding process of initial and focused coding following Charmaz (2006).

Analysis

As mentioned in the introduction to this article, the starting point for the following analysis is that use of the mobile check-in functionality is limited among the respondents and that they further often are quite dismissive of sharing location information in the context of Facebook. Only approximately half of the respondents check in themselves, and the majority of these respondents do so only occasionally in line with the statistics for the general population presented earlier. Furthermore, the respondents are often indifferent (if not negative) towards

the check in practices of others, finding them trivial and irrelevant—in some cases even annoying.

The material analyzed in what follows consists of two distinct but tightly interwoven perspectives corresponding to the distinction between being a sender and a receiver of information. The first concerns the use (and non-use) of check-ins among the respondents and the motivations and rationalizations they present in relation to this. The second concerns the respondents' experiences of the check-in practices of others. In the material the second perspective is the more prominent since all were exposed to check-ins in the role of Facebook audience member but fewer used the functionality themselves.

Location on Facebook: "why would you want to know?"

At the most general level, a main reason that the respondents rarely share their location by checking-in and are often dismissive of the check-ins of others is that they do not consider location information to be relevant in the context of Facebook check-ins:

> "I have seen it on Facebook when people post it. 'Then I am here' and 'Then I am there' and I think that is so silly! I don't want to know where people are. And why would you want to know? If I wanted to know and if the person wanted me to know then he or she would have called and told me."
>
> *Sandra, female, age 18*

> "I've just found out that if I see others do it [check in] then I don't give a damn [Laughs]. And I don't mean that in a mean at all way but then I'm thinking … I don't want to … I mean, why would I do it? Because people also don't care what I am, like, doing at Baresso [a café franchise] right now."
>
> *Rasmus, male, age 17*

The above examples illustrate the common attitude among the respondents that information about the location of others is most often trivial if not irrelevant. To some, the repeated posting of such perceived trivialities, furthermore, is experienced to violate the norms governing the use of Facebook; I shall return to this point later in the analysis.

Sandra's example shows how she does not see the value of sharing location information on Facebook and points to two important reasons why she does not use the feature. First, she and her friends already have set ways of communicating about location when this is relevant. If someone thinks that it is important for her to know his or her location, then she expects him or her to contact her directly by calling or texting. With the need already covered by texting and calling on the mobile phone, it is unclear to Sandra why she would include mobile check-ins to her communication repertoire.

Second, Sandra has no interest in knowing—indeed, she says she does not want to know—the location of her Facebook friends. Location information often serves a clear purpose when exchanged in the context of the directed and dyadic person-to-person communication characteristic of texting and calling. In mobile communication our interlocutors are typically close ties (Ling, Bertel & Sundsøy, 2012), to whom our whereabouts are often both interesting and useful. Location information in this context may for instance be the topic of the conversation, it may help frame the conversation (explain noises in the background and why the conversation must be cut short), as well as form the basis for micro-coordination (Ling, 2004; Weilenmann, 2003). Sandra's example illustrates that it is not to the same extent clear what purpose location information is supposed to serve and what meaning it is supposed to have in the decontextualized and indirect mass self-communication flows characteristic of a check-in on Facebook.

Rasmus' example illustrates how, when mobile check-ins are perceived to be trivial and irrelevant, this diminishes the willingness of the respondents to use the functionality themselves as they do not wish to broadcast such trivial and unimportant information to their Facebook friends. Indeed, Rasmus has found out that he does not care when others check in so as a general rule he does not do it himself.

Interestingly, however, Rasmus has broken this rule a few times. The last time he did, he was at a concert with his little sister, who "thinks that it is cool that her older brother posts that he is with her at a concert". Wanting to make his little sister happy made Rasmus override his usual resistance to using the service, which underscores the fact that the norms surrounding use of the technology are elastic and subject to ongoing negotiation in the face of other wants and needs. As such they are just one factor (albeit an important factor) influencing behavior.

Having thus far considered the use and perceptions of the use of others at a general level, I now proceed to examine the specific use patterns and perceptions pertaining to the purpose-driven and social-driven use practices.

Purpose-driven Uses of Location Information

Coordination: "we usually text where we are". One of the most striking findings in the interviews is that none of the respondents use check-ins on Facebook for coordination or meeting up with friends:

> Interviewer: "Have you ever used it [checking-in] to meet up with your friends?"
>
> Pernille: "Not really. We usually text where we are […] we usually just text and then [write] 'Do you want to hang out? I am at Strøget' [a central row of shopping streets in Copenhagen] or something"
>
> *Pernille, female, age 17*

> "If there's someone I really want to see [when out on the town] then I'll ask 'where are you tonight?' [in a text or call]. If they're close by then 'Oh, cool'. Or else we might run into one another. But I don't use the check-in thing. It sounds like it might be useful, but I don't really use it."
>
> *Nanna, female age 16*

Considering the prominent role afforded to coordination in the locative media literature, it is remarkable that such use simply does not occur among the respondents. While Nanna expresses that checking in to meet up with friends "sounds like it might be useful" and some of the other respondents imagine scenarios where location information might be used to meet or avoid others, this does not translate into actual use.

One reason such practices have come to play a relatively minor role in the communication repertoires of these young Danes is that they are already using other media to coordinate with friends. Most often, the respondents mention using texting or calling when coordinating meetings with friends while on the move. Although other social mobile technologies (such as mobile Facebook) with the proliferation of smartphones and near-ubiquitous internet access are increasingly becoming alternatives to SMS for coordination purposes, none of the respondents mention using such mobile services for group coordination. Although the respondents prefer Facebook over SMS for group coordination, this typically takes place in advance on the PC. (Bertel & Ling, In preparation).

Social-driven Uses of Location Information

With purpose-driven uses being rare among the respondents, most of the discussions of location sharing in the interviews were centered around the social-driven uses. In what follows I will examine first some specific practices of location sharing that are typically deemed inappropriate by the respondents. These are the examples many of the respondents

first reach to when discussing the use of check-ins on Facebook, and in that sense these negative practices often frame the experience of the technology. Following this, I will discuss how, in which contexts, and why the technology is being used by those respondents who do so.

Triviality: "listen, do you have to do that every day?". One practice that is frequently perceived to be inappropriate by the respondents is indiscriminate check-is to ordinary and mundane places:

> "I think sometimes it is ridiculous because people have begun to check in [at] 'lying in my wonderful bed'. Yeah, like anyone asked you! I am too, for god's sake! Am I supposed to tell you like when I am lying… when I am in… Am I supposed to tell you when I am taking a crap? [laughs]. Like 'In the toilet taking a crap'. Checking in at the toilet. It is ridiculous and doesn't make sense to check in all the time."
>
> *Mohammed, Male, age 17*

> Sofie: "There are again also these types who log in everyday in their school where I am a little bit like 'Listen, do you have to do that every day?' Because 'yes, now I am in school', 'I am at the school', 'now I am in the canteen', 'now I am in this room'. Oh, come on! Because they go to school! […] Of course you're in school when you go to school here! Seriously! [...] I really think a lot about it that if it isn't funny and it isn't relevant then you shouldn't write anything because if it's 'Oh, now I'm home and I'm watching television' [then] OK! Seriously, what the hell are they supposed to do with that?"
>
> *Sofie, female, age 18*

To Mohammed there is a limit to how small and mundane things should be communicated on Facebook; others being in bed just like being in the bathroom is not something that he needs to know about. To Sofie, checking in at school is pointless because it is a well known fact that being a student, this is where you are supposed to be during school days. To both these

respondents sharing such trivial and uninteresting information crosses the line of appropriate behavior on Facebook.

Furthermore, Sofie's example, like Rasmus' cited earlier in this paper, highlights how perceived norm violations of others feed back into her own use practices. Assuming the point of view of her Facebook audience, Sofie makes sure to post only things that she believes they will find relevant or fun. In so doing, Sofie points to what appears to be a general and fundamental norm among the respondents according to which information posted on Facebook should be relevant in some way for other people. Typically this means that the information should be useful, interesting, or fun.

Need for attention: "It's a bit like 'look at me!". Checking-in too frequently or in a manner that otherwise appears to be "desperate" for the attention of others is also often frowned upon by the respondents:

> "Most people who do it on my Facebook it is something like "I am at Fitness.dk" [a chain of Fitness centers]. And this happens maybe four times a week from the same person and I really feel like writing to that person 'Do you think I *fucking* care? [2] Do you feel good about yourself now that you're working out four times a week? Do you have to tell it to the rest of us?' […] I just feel that sometimes … especially that thing with the fitness center, that really makes me like *don't fucking care!* Don't post it! You're just expecting people to say 'wow, that's impressive!' and 'cool that you're keeping up your exercise' and things like that. I just think it's incredibly superficial".
>
> *Pipa, female, age 21*

[2] The English term "fucking" is commonly used by young Danes as an edgy, if somewhat coarse, linguistic enhancer. It does not have quite the same offensiveness to it as it does in English.

To Pipa, others sharing their location for the purpose of what she perceives to be angling for the attention and approval of others is something she is clearly not fond of, finding it "incredibly superficial". This point of view is expressed by several other respondents as well:

> "Well, I think that's a little too… Then it's a bit too much with people updating all the time and you have to know where they are and so on. It can get a little tiring in the end. At least I think so. It may be that others think that it is really fun to go in and read it but to me you can just feel the need for attention screaming out of all those updates. I don't use it all that much for that."
>
> *Mette, female, age 18*

> "I think it is a bit weird having to check in all kinds of places […] It just seems a bit like 'Look at me!' 'Where I am and stuff'."
>
> *Pernille, female age 17*

> "That's the Facebook addicts, I think, who do that kind of thing. Because they constantly have to update what they are doing. But then there are different opinions. Anyway, that's my opinion. That if you post everything on Facebook then maybe you're a little addicted, kind of."
>
> *Jonas, male, age 16*

To Mette and Pernille, checking in too frequently—constantly reminding others where one is—"screams out" a need for attention. To Jonas it indicates Facebook addiction. Neither of these perceptions are positive. Although check-ins may be used for self-presentation and the display of identity as indicated by the literature, failing to abide by the implicit rules of appropriate use of Facebook conversely may result in what is effectively negative self-presentation. I shall return to this point in the discussion.

The above examples raise an interesting point concerning the use of check-in messages for social-driven communication. Considering Pipa's example, she appears to be almost offended that someone checks-in all every time he or she goes to the fitness center—her use

of harsh language underscoring the level of her irritation. Pipa considers this practice an intentional act of communication meant to promote the one checking in, angling for the approval of others.

While this may, indeed, be the intent behind the check in, it is not necessarily so. The statistics presented earlier found that 17% do not know why they check in. Both Hjorth & Gu (Hjorth, Wilken & Gu, 2012) and Humphreys (2008b) have noted how check-ins may be used by some as a form of social diary. Furthermore, check-in messages may be intended for a smaller subset of the person's Facebook friends to whom they may have a different meaning.

A basic check-in (consisting or just a location and a time stamp), however, does not convey these intentions when received by the diverse audiences of the mass self-communication flows in which it occurs. First, its communicational content is quite "thin". In the vocabulary of Jakobson (1960) we may consider this content mainly referential (descriptive and factual) and phatic (signaling a desire to communicate). This means that the intent of the sender will to a large degree have to be inferred from very limited communicative cues. Second, being less "prescriptive" than other social locative media (Marwick, 2009), Facebook does itself not offer much in terms of motivation or justification for checking-in. Lacking a clear predefined purpose for location sharing and with no socially established repertoire of conventions and practices to draw on, further complicates the task of message "self-selection" (Castells, 2009: 132) and interpretation.

As such, neither the context of Facebook nor the mobile check-in itself offer much help in decoding the intent behind the check-in message, making it in turn a somewhat "precarious" form of communication. It risks violating the norms of appropriate Facebook behavior and its reception is largely beyond the control of the sender.

This lack of control may, however, to some extent be ameliorated by the sender checking-in selectively and adding other elements (text, tags, photos) to the check-in.

Spatial context: "then it would have to be if you're somewhere special". Continuing this line of thought, one context where the use of check-ins is often considered to be of greater relevance and the respondents mention that they either check-in or might be interesting in doing so is in places that are in some way out of the ordinary:

> "Then it would have to be if you're somewhere special 'I am here at the Queen's' or something, right? Then I might do it, if it was something extraordinary. Then you might want to show it off, but not otherwise."
>
> *Martin, male, age 19*

> "If I was someplace really cool then I'd probably do it […] for instance when I was recently out celebrating the birthday of one of my friends. We had reserved a table at a disco and stuff. That was fun and then we were tagged there. That kind of thing I think is fine but not when you're just two people out drinking coffee or something."
>
> *Alexander, male, age 19*

Martin in the example jokingly describes how he might check in if he is someplace (way) out of the ordinary—for instance visiting the Danish monarch. Such a point of view is common in the interviews although for other respondents less fanciful locations will also suffice, as exemplified by Alexander's statement, where he and his friends checked in (and were tagged) at a bar where they had reserved a private table. Checking in at the airport, while travelling, or the at cinema are additional and typical examples.

Returning to the discussion of the lack of communicative control when using check-ins from the previous section, reserving use for special meaningful places such as described in the above is one way of controlling reception. Checking in while abroad, for instance, tells a

story that to most of the respondents does not conflict with norms of use because it is sufficiently interesting (and rare) to justify being shared with others on Facebook.

Some places that are neither entirely mundane nor entirely spectacular separate the respondents to a higher degree; to some checking in at a café is both relevant and appropriate, and to some it is not. This again underscores that norms are not fixed but are constantly being negotiated.

Social context: "there's also just more to it, if you're with other people". Another factor that may influence use and reception is the social context in which the check-in takes place:

> Jacob: "If you're with somebody and you, like, want to show that you feel good, or that you are having a really good time right now, then I'll write 'I am with these people at this place'. 'We are hanging out on Strøget' [a row of shopping streets in Central Copenhagen] for instance, I could do that. But you can say that there is… It is more fun to do when you are with other people, I think. Not when you are alone."
>
> Interviewer: "No, how come?"
>
> Jacob: "I don't know."
>
> Interviewer: "Do you have any idea?"
>
> Jacob: "I think it is kind of like you don't want to show that you are alone. You're supposed to be… You're supposed to always be with someone […] I think it is some kind of norm or something, that it is cool to be with other people all the time. And then there's also just more to it, if you're with other people and you're writing that you're at this place."
>
> *Jacob, male, age 17*

To Jacob there is a clear difference between checking in when he is alone and when he is with other people; checking-in with others is just more fun. When asked why he thinks this is the case, Jacob points to what he perceives is a general norm; that it is cool to be (and show that one is) with other people. Checking in while with others, then, is in line with this norm

and may reflect positively on the one performing the check-in. Further, checking-in with others arguably does not to the same extent express a need for attention as when someone checks in alone.

Apart from pointing to what he perceives to be a general norm of being social, Jacob makes another and equally interesting point in his offhand remark that there is "just more to it" if one checks in while with other people. Showing that one is at some location with others (via tagging and/or photos), tells a richer and arguably more interesting social story than simply checking in, a story where location becomes just one aspect of a grander narrative.

As context: "it creates another kind of connection with what you're writing". Proceeding in a similar vein, it is clear that location information may also be used in connection with other information, such as for instance text or photos:

> Line: "It is fun that people can see where you are. So they can see the connection to what you're writing maybe […] it is like it creates another kind of connection with what you're writing."
>
> Interviewer: "How does it create another kind of connection?"
>
> Line: "Well, if I for instance write that I have just had hot cocoa and then write 'here', at my high school or something, it kind of gives it another meaning than if it just says that I had hot cocoa. Like that. And then I also tag a lot of people when I post."
>
> Interviewer: "When you check in?"
>
> Line: "Yes, when you check in then you can also tag people. So it says 'had hot cocoa with' two people and then 'here' at my high school. Then it becomes complete."
>
> *Line, female, age 16*

Line's example illustrates how location information may have increased relevancy when used in connection with—and as context of—other social information. This is captured succinctly

by her statement that a Facebook message "becomes complete" when text is augmented by information pertaining to both the social context (tags) and location (check-in).

On its own, location information may not be not particularly interesting or meaningful, but when placed in (and as) the context of other information (text, tags, photo) shared on Facebook it becomes part of—adding to—the overall narrative and is valuable as such. Checking in at school, as mentioned by Sofie above, may be perceived as trivial and irrelevant. Checking in at school coupled with the text "Is attending the class of death with" and tagging one's classmates (as Pernille mentions a Facebook friend jokingly doing), however, is likely perceived as more relevant because in this context—and as context—it is given meaning and makes sense.

Discussion

Previous research has indicated that locative media may hold a special potential for (group) coordination, facilitating meeting up with friends based on knowledge about their location. None of the respondents in this study, however, use check-ins for such purpose-driven communication. This is mainly because they already use other, more direct, means for coordination purposes; particularly calling and texting (via SMS) or, if coordination occurs ahead of time, Facebook. With their coordination needs already covered, it is unclear to them why they would want to use the indirect mass self-communication of check-ins for such purposes.

While social-driven communication is more common among the respondents, it is still relatively limited with only approximately half engaging in such practices and most of these respondents doing so only infrequently.

Previous research has indicated that social-driven location sharing has become "an important piece of personal […] identity construction" (de Souza e Silva & Frith, 2012: 163) and may help build and maintain presence in social networks as well as generate social capital (Hjorth & Gu, 2012; Hjorth, Wilken & Gu, 2012).

While the above analysis has shown that location may indeed be used for self-presentation (such as when someone checks in alongside other people or in cool places) this identity construction may not be entirely unproblematic as mobile check-ins on Facebook are often perceived to be trivial and irrelevant if not annoying by the respondents.

Goffman argues that an individual when engaging in self-presentation towards others will typically seek to adapt his behavior "so that it will convey an impression to others which it is in his interests to convey" (Goffman, 1959: 16). However, Goffman also stipulates that the success of such self-presentational efforts is not entirely up to the individual, but depends on social negotiation with the audience to a given act of self-presentation. Despite the (best) intentions of the individual seeking to convey a certain impression of self to others, this effort may be flawed in various ways, effectively conveying a different impression than was intended (Goffman, 1959: 18).

When check-ins are often perceived to violate the norms of appropriate Facebook behavior and are consequently received with indifference if not negativity, it is clear that this may reflect negatively back on the individual doing the check-in and effectively work against positive self-presentation as well and the generation and maintenance of presence and social capital.

Those who do check in, most often do so in special meaningful places, when they are with others, or augment the check-in with other user generated content (tags, text, photos). All of this effectively serves to situate the check-in in a meaningful context, making norm

violations less likely. As such, the relative minor role that checking in has come to play among these young Danes in a sense can be said to reflect a strategy of "playing it safe", where users make sure to abide by the norms of appropriate Facebook use, for instance by checking in in ways they believe others will find relevant.

How, then, may we understand the discrepancy between the promise of location sharing technology and the relatively minor role this technology has come to play in the everyday lives of these young Danes? While there is no one factor that explains this discrepancy it is clear that there are (at least) three ways this study differs from most other empirical studies of location sharing technology. First, the respondents are not lead users as opposed to some previous studies. Second, the service under study is not as prescriptive as other locative media; users do not a priori accept location sharing as the premise for using Facebook but rather have to find meaning for sharing location information themselves within the general social platform. Third, the study takes place in Denmark versus for instance the US, China, or Korea. While it is difficult to assess the influence of culture more generally, one area where differences are clear is in the relatively limited size of the urban areas where the ability to discover new and interesting places is arguably more modest than for instance in New York (Humphreys, 2008b), Shanghai, or Seoul (Hjorth, Wilken & Gu, 2012; Hjorth, 2013).

Conclusion

The locative media literature, which is based on few empirical studies that are often conducted with lead users and in specialized "prescriptive" (Marwick, 2009) media contexts has suggested that the sharing of location information in networked social media may have significant consequences for how users coordinate and socialize in public space as well as for maintaining network presence, generating social capital and personal identity.

The analysis presented in this paper, however, finds that the use of the check-in functionality on Facebook, while well known to the young Danish smartphone and Facebook users in the sample, is generally limited. Only approximately half of the respondents in the present study use the functionality, and those who do only do so occasionally.

Purpose-driven practices of sharing location with networked others to coordinate gatherings or meet up via Facebook are particularly limited. While in theory checking in to a place is a way of saying "Hey, I'm here. Is there anybody around?" (de Souza e Silva & Frith, 2012: 164), meeting up via such indirect mass self-communication (Castells, 2009) does not occur among the respondents, who favor more direct communication (mainly calling, texting, and PC based Facebook) for coordination purposes.

Social-driven uses are more common but are typically infrequent. The analysis has shown that the use of check-ins for the purposes of self-presentation is not without problems. To the "ordinary" young Danish smartphone and Facebook users in the present sample, sharing location via check-ins is more often than not perceived to be of little relevance—sometimes it is even considered to be annoying. To these respondents, there is the general understanding that for a Facebook post to be relevant for others, it should be useful, interesting, or fun. Check-ins are often perceived to be neither.

Furthermore, check-ins to locations that are overly mundane and expected (such as school in the case of high school students), that occur too frequently, or in a manner that is perceived as "desperate" (e.g. repetitively checking in to fitness centers) are behaviors that violate the norms of appropriate behavior on Facebook and are often perceived quite negatively. Checking-in to special meaningful places (such as while abroad or in an airport), when with (tagged) friends, or in (and as) context of other user generated content (text, tags, photos) conversely, are often perceived to be more relevant, sometimes even interesting to

follow. The line between interesting and irrelevant sharing of location information, however, is not firm; to some checking in at a café drinking coffee with a friend is worthy of sharing while for others it is irrelevant.

Because mobile check-ins are often received with indifference if not negativity, often they may not be suitable for self-presentational purposes (Goffman, 1959). They also often cannot be assumed to create a positive network presence or form a social capital resource as indicated by the literature.

These findings—and the discrepancy between them and the existing literature—underscore that the use and experience of socially shared location information may vary greatly between technological contexts and user groups. For this reason, it is problematic to extrapolate and generalize from previous studies conducted in specialized technological contexts (for instance highly "prescriptive" social media) with lead users to more general mainstream contexts where user characteristics, needs, and norms are different.

As a final note, then, this highlights that more empirical studies among ordinary users in non-specialized technological environments are needed to provide a more nuanced understanding of the potentials of locative media, to complement and ground the growing body of mainly theoretical work, and to balance the existing empirical studies within specialized populations and contexts.

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Table 1: The use of locative media among ITU students 2010-2012 (in percent)

Service	Year	n	Daily	Weekly	Monthly	Monthly < **	Never *
Location based services***	2010	294	8	15	6		72
Facebook Places	2011	245	0	11	11		78
	2012	281	1	7	12	12	67
Foursquare	2011	245	7	6	6		81
	2012	282	5	5	1	6	82
Gowalla	2011	245	0	0	1		99
Other	2012	280	2	5	3	2	89

** Covers the categories "Never" and "Not available on my mobile phone".*

*** The "Less than monthly" category was introduced in 2012.*

****"Location-based services (such as Foursquare, Gowalla)".*

Article 5:

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“It’s Just Not That Exciting Anymore”– The Changing Centrality of SMS in the Everyday Lives of Young Danes

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Abstract

This paper considers the centrality of SMS texting in the communication repertoires of young Danes. Recent years have seen dramatic changes to the mediascape with a multitude of new possibilities for text-based communication; Facebook in particular has become popular to the point of ubiquity among young Danes. Some have suggested that that the role and importance of SMS texting, a technology that was previously an entrenched part of young people's communication repertoires, has changed in this diversified media environment. Based on individual grounded theory analysis of interviews with 31 Danish high school students and drawing on the Domestication approach, this paper examines the use practices and meanings associated with SMS texting in todays complex and evolving mediascape. It asks: how is SMS re-domesticated and which role does technology occupy in the communication repertoires of young Danes?

Keywords: SMS, texting, Facebook, domestication, youth

Introduction

From the early to mid 2000s and onward, text messaging via the *short message system* (SMS) has been ubiquitous among Danish youth (Bille, Fridberg, Storgaard, et al., 2005). Originally designed to distribute service messages, Young people in the Nordic countries discovered the communicative potential of the SMS protocol and made texting a fixture of youth culture (Ling, 2004). Today, virtually all young Danes use SMS and it remains the communication channel that they are most likely to use on a daily basis (Kobbernagel, Schrøder & Drotner, 2011a; Statistics Denmark, 2012a).

Recent years have, however, seen the number of SMS messages sent on Danish networks decrease, most notably in the very recent past (The Danish Business Authority, 2013a). Some have suggested that this decrease may be influenced by the changed media landscape, in particular the widespread use of Facebook, which offers similar functionality to SMS (Bertel & Stald, 2013; Helles, 2013; DR Medieforskning, 2013).

While such an explanation is likely too functional and simplistic, it does raise interesting questions about the centrality of SMS in the lives of young people in Denmark today. Indeed, the mediascape in recent years has become increasingly complex, offering a multitude of competing ways to communicate and be in touch. In this changed mediascape, which role does SMS occupy among young people who previously have been found to use this technology so intensely?

Drawing on the domestication approach, this article considers the centrality of texting in the communication repertoires of young Danes in the light of changes that have occurred in the media landscape in recent years. Building on 31 semi-structured interviews with Danish high school students and a grounded theory approach it asks: How is texting re-domesticated and which role does this technology occupy in the communication repertoires of young Danes?

Domestication of media technologies

In this article we draw on the domestication framework for understanding how users appropriate new technologies and re-appropriate older ones, fitting them into everyday life and making them their own (Haddon, 2003, 2011; Silverstone, Hirsch & Morley, 1992). This framework is characterized by having a strong focus on user agency in the wider consumption of media in everyday life as opposed to their adoption and use alone (Silverstone, 1994). The domestication framework, furthermore, emphasizes a focus on the meaning-making processes associated with media technologies and how they are experienced as well as their display and symbolic value for personal and group identities (Haddon, 2011; Ling, 2004). In the present context, the framework is used to examine the changing centrality of SMS in the media repertoires of young Danes.

Communication repertoires of Danish youth

The young Danes interviewed in this study live in a country with a long history of early adoption of ICTs (Drotner, 2001), where ownership and use of communication technologies is commonplace. In 2012, 92% of all households owned a computer (Statistics Denmark, 2012b) and surveys from 2009 and 2011 found that nearly everyone above the age of 10 had their own mobile phone (Bucht, Livingstone & Haddon, 2009; Kobbernagel, Schrøder & Drotner, 2011a). Among the 15-34 year-olds, 77% in 2012 owned smartphones (Aarup, Nielsen, Steenberg, et al., 2012). Virtually all young people in Denmark use the internet (Statistics Denmark, 2012b) and 78% of young people aged 16-19 in 2012 used the internet on mobile phones (Statistics Denmark, 2012a).

The use of SMS and Facebook in 2011 was found to top the list of daily media activities among 13-23 year-old Danes as number one and two respectively (Kobbernagel,

Schrøder & Drotner, 2011a: 17). SMS texting was used by 98% of the 16-19 year-olds in 2012 (Statistics Denmark, 2012b) and a survey from 2011, furthermore found that 87% of the 13-23 year-olds used SMS on a daily basis. Only 54%, by comparison, used voice calls on a daily basis, but total use of voice calls was also very high at 97% (Kobbernagel, Schrøder & Drotner, 2011b: 27). While ubiquitous among Danish youth, traffic data has shown that the number of SMS messages that was sent on Danish networks has been declining in recent years. The total volume of messages peaked in 2010 and has been declining since[1], most significantly in the very recent past as evidenced by a drop in the total number of sent SMS messages of 8.2% between the second half-year of 2011 and the second half-year of 2012 (The Danish Business Authority, 2013b). Taken together, the decline in the number of sent messages and the fact that SMS texting was both ubiquitous and the most used service in 2012 indicates that although SMS texting is not disappearing in a Danish context, practices of use appear to be changing.

After a somewhat slow start, Facebook since 2008 has become the (by far) most well known and used social network site in Denmark (Jensen & Sørensen, 2013: 51). It was the most popular service on the web in Denmark in 2012, measured by the amount of time users spent on the service, and the 15-24 year-olds used Facebook the most (Association of Danish Media, 2012: 22). A survey from 2009 found that among 16-24 year-old Danes, 90% used social networking services and 77% specifically used Facebook (Jensen & Sørensen, 2013: 52). Another survey from the same year conducted among children and young people aged 9-16 found that 73% of those who had an online profile had this with Facebook (Bucht, Livingstone & Haddon, 2009: 60). Furthermore, 64% of the 16-19 year-olds, used "social

[1] The number of sent SMS messages per subscription per half-year, however, has been declining since 2008 (The Danish Business Authority, 2013a: 12).

networking services" (which in most cases means Facebook cf. the previous lines) on their mobile phones in 2012 (Statistics Denmark, 2012a).

Literature review

The following literature review, as well as the analysis to which it is a prelude, will focus on three aspects that are central to understanding the use of SMS (and to a lesser degree voice calls) and the way it may be repositioned in the mediascape following new media developments. First the social ties which SMS has been found to support are explored. Then the literature of the instrumental uses are reviewed before finally moving on to the expressive uses.

SMS texting and social ties

There is general consensus in the literature that mobile communication is mainly associated with what Granovetter (1973) has referred to as strong ties, in particular the core group of family and friends (Ling & Stald, 2010). Most often mobile communication is used for coordination of daily activities (Ling & Yttri, 2002) or staying updated with the closest friends (Licoppe, 2004; Reid & Reid, 2005). Indeed, Ling, Bertel, and Sundsøye in an analysis of a large set of mobile traffic data found that the circle of people that one typically texts and calls is quite small; about half of all communication goes to only five persons in the case of texting and three persons in the case of voice calls (2012).

Less often discussed in the literature (at least explicitly) is the use of mobile communication with the network of weaker ties. This does, however, not mean that SMS is not used for communication with such ties. Kasesniemi & Rautiainen for instance found that among young people, SMS texting is often the venue of choice for initiating contact and exploring new relationships (2004: 183). Oksman & Turtiainen similarly found that romantic relationships between teens frequently begin through SMS messaging (Oksman & Turtiainen,

2004: 326). Grinter & Eldritch found that teens sometimes use SMS to avoid making conversation with people they do not know well, for instance when flirting (Grinter & Eldridge, 2001). Oksman and Rautiainen describe how humorous chain messages are sometimes sent to initiate a relationship and gauge the interest of the other. Gradually the relationship then develop from this starting point becoming increasingly intimate and personal (2002: 28).

One significant aspect that facilitates communication with weaker ties is the greater interactional control associated with the text-based and asynchronous communication of SMS. By using SMS, users are given time to compose their messages, avoiding awkward silences and unwanted nonverbal cues typically present in unmediated or voice communication. This serves to make "difficult" communication easier to manage (Ling, 2000; Geser, 2004) and lower the threshold for taking up communication (Ling & Yttri, 2006: 227).

Another aspect is the mobile contact list. As documented by the literature, mobile telephone numbers have been considered something to be collected and compared, the number of entries in the contact list serving as a form of popularity measure (Kasesniemi, 2003: 126; Ling, 2004: 109). Numbers have been collected as part of the contact ritual (Ling & Yttri, 2002: 160) and often have come to make up the "social universe" of users (Ling & Campbell, 2011: 10). Indeed, according to Kasesniemi "an empty [phonebook] memory can be interpreted as symbolic of an empty life" (2003: 126). In some cases the contact information of even latent ties have been saved and kept "just in case" (Kasesniemi, 2003: 142) as "a potential resource pool" that could prove useful in the future (Geser, 2004: 19).

SMS texting and coordination

The perhaps most important use practice associated with mobile communication is that of "micro-coordination" (Ling & Yttri, 2002), the continuous flexible micro-level coordination

made possible by the individual addressability and perpetual contact of mobile communication. The ability of users to micro-coordinate on an ongoing basis in everyday life, it has been argued, has lead to a relaxation of the norms around clock-based timekeeping and punctuality. Schedules and time has "softened" (Ling & Yttri, 2002) and a new "flexible punctuality" has become the norm in many contexts (Larsen, Urry & Axhausen, 2008).

Although mobile communication has been associated with an increased flexibility in the schedules and coordination of everyday life, the fact that communication via SMS texting and calls is principally dyadic in nature makes it inflexible for (dialogical) group communication where many need to communicate with many (Larsen, Urry & Axhausen, 2008: 642; Ling, 2012: 126).

SMS texting and social communication

While both adults and young people use the mobile phone for coordination, the extent to which teens have used SMS texting for social communication set them apart from other groups. For teens, "the most important thing in mobile communication remains building up and maintaining their social networks" (Oksman & Rautiainen, 2002: 28) and a large proportion of the content of their SMS messages is relational and phatic (Thurlow & Brown, 2003).

Continuously keeping in touch via SMS (and in some cases calls), teens have been found to create a sense of "connected presence" (Licoppe, 2004) with their peers. Messages are exchanged in a form of "gifting economy" guided by rules and expectations of reciprocity (Johnsen, 2003). SMS is, for instance, used for playful forwarding of chain messages (e.g. jokes), for gossip, for phatic communication in seemingly pointless messages, as well as for deep discussions of highly personal topics (Kasesniemi, 2003). Young people have developed elaborate texting cultures (Caron & Caronia, 2007; Goggin, 2006), including specialized argot and norms, the mastery of which has helped to define group membership (Grinter &

Eldridge, 2001). The asynchronous and text-based character of SMS has allowed them to flirt and be more confident than they have dared in real life (Kasesniemi, 2003) as well as to communicate under the radar of adult supervision (Campbell & Park, 2008). As such, texting fits the youth life phase with its increasing orientation towards the peer group and negotiations of dependency and autonomy from the family (Ling & Yttri, 2006) and has been a deeply entrenched fixture in teen culture (Ling, 2012).

Method

The study was conducted using a grounded theory methodology (Charmaz, 2006). This provided a flexible approach to exploring the complex and evolving media use practices of young Danes. The method of data collection was in-depth qualitative interviewing, which was chosen because it provides a degree of flexibility and control over the generation of the data that fits the analytic strategies of grounded theory particularly well (Charmaz, 2006: 28). A total of 31 individual semi-structured interviews (Kvale & Brinkmann, 2009) were conducted with Danish high school students and form the empirical basis of the article.

The interviews were conducted in two rounds in October 2011 and in April 2012. Out of 31 respondents, 17 were female and 14 were male. The respondents were aged between 16 and 21 (M=17.7, SD=1.1) and were approximately evenly spread across high school year 1-3. Out of these respondents 27 owned smartphones, 30 used Facebook, and 25 used mobile Facebook.

The respondents were recruited from three different high schools in an effort to diversify the empirical material; one school was located in central Copenhagen, one in the periphery of the Copenhagen area, and one in central Jutland. The interviews were conducted at the school premises, providing students a "protected place" (Lindlof & Taylor, 2011) to feel confident and at home during the interviews.

The interviews were audio recorded and transcribed and subsequently analyzed using the computer assisted qualitative data analysis software Atlas.ti 7 where coding was conducted by a single analyst in an iterative coding process of initial and focused coding following Charmaz (2006).

Analysis

Communication repertoires of the respondents

The teens participating in this study use SMS texting, mobile phone calls, and Facebook to cover the (vast) majority of their general communication needs. In addition to these technologies, other media are also used for more specialized purposes. In the context of high school life, the respondents use Lectio (lectio.dk), an information and communication system used by the high schools they attend (see also Bertel, In Press). Email is typically used for what the respondents consider "formal" communication such as various subscriptions (newsletters, deal-of-the-day offers etc.) and work; it is, however, seldom used for social communication with peers. MMS is popular for sharing images that for various reasons are not suitable for sharing with a larger audience, e.g. on Facebook; this could for instance be humorous bad photos of self or others. Skype is often used for keeping contact with friends or family that are far away—as when some have friends currently studying abroad. Networked games such as Wordfeud are widely used among the respondents and may to some extent also be used for communication purposes although this was not documented in the interviews. Very few use Twitter and only one respondent use Instagram.

Taken together, the interviews show that while the respondents use a range of different communication technologies in everyday life, the main ones are SMS texting, voice calls, and Facebook. Because Facebook occupies such a central role in the communication repertoires of these young Danes the use of SMS in what follows will predominantly be discussed vis-à-

vis the use of Facebook. This is also true to the way the respondents themselves discussed the use of these media, often pointing to one to explain the use of the other.

SMS texting and social ties

In the literature review, it was clear that although SMS has mainly been a medium for strong-tie communication, it has also been used for communication with weaker ties. The young Danish high school students in the present study, however, rarely use SMS (or voice calls) to communicate with weak ties. Indeed, it appears that among the respondents, communication with weaker ties in most cases occurs on Facebook. The interviews show that access to phone numbers and the use of mobile voice calls and SMS texting is often reserved for strong ties and "necessary" communication, for instance practical matters such as coordinating face-to-face interaction. Family, close friends, boy- or girlfriends, co-workers and co-commuters are typical examples of persons the respondents communicate with via SMS and voice calls:

> The people I contact via mobile are the ones I need in my everyday life. The rest takes place online (Maria, female, age 17)

> Who I write with on Facebook differs a bit more [than SMS]. When I'm lying around and writing SMSses that's more for some specific people […] the people I have on SMS that's like mostly my family. My mother, my little brother and my father and then some of the top friends. My best friend and some of the others. And on Facebook it's more all-round (Line, female, age 16).

Where exchanging telephone numbers in previous research was found to be a fixed part of the contact ritual among Nordic youth (Ling & Yttri, 2006), several of the respondents in the present study describe how when meeting new people they will instead add them first as friends on Facebook and let the relationship develop from there. Indeed, rather than the mobile phonebook, today it is Facebook that make up the most complete catalogue of the individual user's social world (Larsen, 2009: 59).

Two aspects are particularly relevant to this change. First, it is easier to add someone on Facebook than on the mobile phone because you do not need a number to do so. This means that a person does not need to key in, memorize, or write down the number of a newly met contact immediately but simply needs to remember a name (or the name of a friend that is likely to have the contact in their public list of friends where the information then can be retrieved). Furthermore, asking someone to be a contact on Facebook adds a layer of mediation to that act, making it less awkward than requesting a telephone number. Second, Facebook has become the primary arena for managing weak contacts. It is typically only after the relationship develops that one is included into the circle of SMS texting partners:

> If you can put it like that then being friends on Facebook … you don't necessarily need to have ever talked. But then if you write together in [Facebook] chat then you're a bit closer. And if you then have each other's mobile phone numbers then it's a bit more intimate … the relationship is a bit more intimate [laughs] (Maria, female, age 17).

> It's like different levels that you reach. When you're, like, [starting out, it is] at the Facebook level and then if you get to the phone level [SMS texting] then you use both. And if you get to the level of calling then you use all three or something. I don't know. I just think it is something you, like, have to build up in a way (Sara, female, age 18).

These examples illustrate that where SMS and voice calls are reserved for communication with stronger ties, Facebook is becoming an all-purpose communication platform for handling both weaker and stronger ties and is typically the first medium one uses with a new contact. Once a relationship has developed and the tie has become strong enough that a person has a legitimate need for communication via the more exclusive, direct, and immediate communication of SMS (and in some cases voice calls), then this may be used by the couple. However, there are of course also exceptions to this rule as when some respondents describe that one might give the mobile phone number to a romantic interest without first using Facebook. In this case the romantic interest is, however, someone that the

person would typically feel some need to be in direct contact with despite the fact that the person is a weak tie.

The above suggests that there has been a migration of weak tie communication from traditional mobile communication functionalities to Facebook, effectively rendering traditional mobile phone communication an even more specialized and exclusive environment for strong tie communication.

SMS texting and coordination

The interviews show that among the respondents in the present study, micro-coordination is still an essential use of both SMS and voice communication; whether arranging meetings with friends, a pick-up by car, or telling parents if they will be home for supper traditional mobile phone functionalities remain central.

For communicative couples who have access to multiple channels of communication, the choice of where to (micro-) coordinate to a large degree has become a matter of "whatever works" for a given purpose. Dyadic coordination, while often associated with SMS, can occur across any connection. If both parties are on Facebook (or any other shared communicative environment) on their personal computers or smartphones, then they can coordinate using this channel just as well as SMS.

Although it is thus no longer the only option for mobile coordination, often SMS texting or voice calls is the preferred channel of (micro-) coordination. Virtually everyone from peers to parents to soccer coaches is reachable by SMS and voice calls:

> SMS is, like… well… more reliable. Because then you know that they'll see it if they have their phone on them. Then there's no excuse (Martin, male, age 19).

Mobile Facebook, on the other hand, requires access to and mastery of more sophisticated technology in the form of a smartphone. While most young Danes today own smartphones, there are still around a quarter who do not—a proportion that is significantly higher among

older groups (Aarup, Nielsen, Steenberg, et al., 2012). As such, SMS and voice calls remain reliable communicative "baselines" in the increasingly complex mediascape.[2]

Coordination of larger groups (and sometimes smaller groups as well), on the other hand, according to the respondents mostly occur on Facebook, which offers convenient functionality specifically designed for group interaction where many communicate with many. A prominent example of how Facebook is used for group communication and coordination is that virtually all of the respondents describe how their classes have set up closed groups for communication among classmates. Within these groups, all can see and participate in the ongoing conversation simultaneously. At the same time, the groups also limit the communication to just the group members, making it a safe and semi-private space, where students can ask (and provide answers to) questions about homework or lost items as well as to plan the next class party, comment on how boring the current class is or inform others that they have found out class is cancelled the following day:

> In the beginning in our class we had a telephone chain so we could write around to everyone if class was cancelled. And I've never seen that get used. But since then someone started a group on Facebook called 3.d [the class name] where everyone is a member. And then there was a day where class was cancelled and it got posted there. Someone posts it. Then everyone gets a notification […] It [the group] has been used a lot. I'm actually surprised. If there's a party for the class or something then this is the place it gets announced because everybody is a member and everybody checks Facebook (Matthias, male, age 19).

Another common but more specialized example of group coordination is that of Facebook "events". This functionality is mostly (although not exclusively) used for occasions where a larger number of people are attending some social event and where coordination via SMS would be inefficient. Facebook "events" consist in the main of a calendar entry and a

[2] While SMS and voice calls are both considered more reliable than mobile Facebook, voice calls are often preferred over all other media when communication is urgent.

special communicative space. In this space, details about the event (venue, time, how to get there etc.) is posted and available to all that are invited to the event. The invitees can state whether they attend, do not attend or maybe will attend and the event is consequently added (or not) to their respective Facebook calendars, helping them to keep track of their future plans. Questions can be asked of the persons in charge of the event and such exchanges will be visible to all invitees, meaning that common questions only have to be answered once, limiting the coordination load when compared with SMS texting or voice calls:

> If someone for instance is inviting you to a birthday party or something then SMS just isn't used for that anymore. Now it is just so easy to set up an event on Facebook or just send a [Facebook] message around to those you want [to invite] (Pipa, female, age 21).

> Me and my sister are throwing an 18th birthday party […] and we've written like "this is my wish list" and "this is where you have to go" and "you have to be there at this time" and things like that. And it's also very practical that they can find out things… get some information about where to be and at what time so you avoid being spammed with SMS messages about "when am I supposed to be there?", "when are we doing this and that" and so on. It's all in there. I think it's brilliant that you can just keep everything right there in this one place rather than everyone coming over and asking and [SMS] texting (Anne, female, age 17).

It is clear that both Facebook groups and events offer a more convenient way to deal with group communication than SMS or voice calls—in particular by allowing all relevant parties to be included in the conversation at the same time. While much group coordination, thus, appears to have been taken over by such purpose-tailored and more efficient group communication functionality on Facebook, SMS texting still serves an important function as an immediate and reliable group coordination medium in situations where Facebook for various reasons cannot be relied on:

> Well, in the days leading up to [the event] we do it [coordinate] via Facebook. And then on the day […] it's SMS. I think that's easier. Because you can keep a phone in your pocket and you can't do that with a laptop. And not everyone has a smartphone with Facebook access. So I think it's easier with the mobile phone. And that's also why I'm saying that this [the computer] is the prelude, and this [the mobile phone] is the final if you can put it like that (Christian, male, age 17).

This example illustrates that although group coordination via SMS texting (or voice calls) is less convenient than the purpose-tailored group communication on Facebook, it remains the best—really, the only—means of last-minute group micro-coordination if not all communication partners have smartphones and data subscriptions.

SMS texting and social communication

The focus now turns to the area of social communication. Being a vast area that would be very difficult to cover exhaustively, we focus in what follows on certain dimensions of the social uses of SMS (and Facebook) that emerged as the most salient themes in the interviews.

As a first point, it is clear that the respondents still use SMS widely for social communication purposes, particularly for communication with strong ties. Yet, it is also clear from the accounts of the respondents that their social use of SMS has declined. These young Danes grew up when the use of SMS was at its peak and many of them describe how in this period of their life, they used SMS much more for social purposes than they do today:

> I actually do not write as much over SMS as I did when I was younger […] it's just not that exciting anymore. And you have like… Back then it was cool to write with boys and those kinds of things. It's a little bit, like, you're past that now. Now Facebook is what's new (Christina, female, age 18).

> I don't use it as much as I did some years ago. Then I really SMSsed a lot, sent like hundreds of messages each day. Now I don't think I write all that much, actually. I think that when I was around 14 or 15 years old, I used to write to people, like, "what are you up to?" and stuff. I don't really do that anymore. Now I only write if there is something important and often I don't bother writing at all. Then I call and ask what I want to ask. Yeah, I think I call more […] I think it's a mix that I've got older and now Facebook is there and then you write in there if there's something you want to say to one another (Sofie, female, age 18).

> When I was younger I did it a lot. Then it was like all the time, right. But now […] having conversations over SMS is like a little bit… It is OK, right, but… In case someone writes me I might call them back instead (Alexander, male, age 19).

There is the sense in the interviews and in the above examples that the intense exchanges of relational messages (as epitomized by messages of the mainly phatic "what are you doing?" type) that were common when the respondents were growing up is something that they have grown out of, something that now seems outmoded or perhaps even a little childish to them. It is not new that teens' communication practices mature over time and that "what was accepted when 13 years old is laughed at and a source of embarrassment by the time they are 18 years" (Harper & Hamill, 2005: 69). The change these respondents describe is, however, interesting because it signals a shift in communication preferences of older teens. Indeed, previous research has found that the use of SMS texting when it was at its peak in 2007 was most used by the 17-19-year-olds (Ling, Bertel & Sundsøy, 2012), where these respondents who belong to the same age group experience that their use peaked several years ago.

SMS today has become taken-for-granted as a reliable communicative baseline medium for strong tie communication in particular. Part of this taken-for-grantedness is, however, that the technology has lost the sense of excitement it was initially associated with. This was also clear from the interview sessions; the respondents found it much more interesting to discuss the use of Facebook than SMS. They told rich stories about how pointless but entertaining and fun using Facebook is; how they pull pranks with one another by for instance grabbing a person's unattended computer and writing a lewd status update from it (a practice referred to as "Facerape"); how they "stalk" others by browsing their profiles and photos; what they like and hate when others post etc. On the other hand, discussions of SMS were much less lively and clearly less interesting to them.

Another aspect of the above quotations is that the respondents today prefer to use other technologies. Many mention how they will often prefer voice calls over texting, particularly if they have something important to discuss. While in the early days of SMS, it was much cheaper to text than to call (Ling, 2004), in the course of the last ten years the cost of mobile

voice calls has decreased dramatically—as much as 75% measure by fixed prices (The Danish Business Authority, 2013a). At the same time the respondents have become older and many have jobs which has increased their ability to spend money on voice telephony.

Looking more directly at functional alternatives to SMS texting, young Danes today also have the option to use SMS-like functionality in many other media contexts, including Facebook. This gives them more choices for where to communicate or even the choice of using different channels for communicating about different matters:

> Facebook is for the longer conversations, I'd use Facebook for that. Whereas SMS is more for the brief and clear message "I'll meet you at this place" or "Where are you?" (Jacob, male, age 17).

> On SMS I don't write those "what are you doing?" messages. I can do that on Facebook (Nanna, Female, age 16).

These examples illustrate that Facebook may be preferred for the longer conversations often associated with social communication. A significant but quite mundane aspect of this division of labor between the mobile handset and the personal computer is that the latter better affords longer textual interactions. The greater ease of writing longer messages on the full-size (and auto-correct-free) keyboard of the computer is for instance frequently emphasized as a motivation for using PC-based Facebook instead of SMS (and for using PC-based Facebook instead of mobile Facebook):

> When I am sitting by the computer then I don't like to SMS, then I hate it. Then I hate [using] my phone except for calls. So every time someone [SMS] texts me then I write "come on Facebook if you want to talk with me" (Mohammed, male, age 17).

From a relational perspective, it is clear that since Facebook is used for communication with a wider network of friends and acquaintances than SMS, this is also reflected in the social communication in these media:

> [On Facebook] you can write with a mix of people [friends and acquaintances] and then it can just be quick conversations that aren't necessarily very personal. It's just, like, "it was fun what you did in school today" or something. But you don't do that over the phone (Christina, female, age 18).

> I spent a year at a boarding school and then there's all those people from that school [on Facebook], where you just write to say "hi" and "how are you doing?". I wouldn't do that on the phone (Line, female, age 16).

Facebook is typically considered the venue for "small-talk" (Sørensen, 2012) and casual exchanges with the extended network of friends. SMS is typically used more exclusively with strong ties and this, to some, makes SMS a more personal communication channel than Facebook:

> I can have deep conversations [via SMS], no problem. But it is not with everybody. I don't write that over Facebook. There, the phone is a bit more personal in some way, writing an SMS (Camilla, female, age 17).

> On Facebook, that's where you talk about the lightweight stuff. So if you look at it [like that], it might be that my SMS conversations mean a bit more. Their content has more meaning than Facebook (Matthias, male, age 19).

Apart from influence of the social relations, certain properties and contextual factors also influence the meanings users ascribe to these channels. For instance, the fact that Facebook is often used on big screen computers in crowded classrooms where others can easily read what is on one's screen to some makes Facebook less suitable for private and personal communication even through direct communication such as chat. Furthermore, if one fails to log out of Facebook and leaves the computer unattended, according to some this may put the conversations at risk of been seen by nosy classmates. SMS on the other hand is tied to a specific handset which rarely leaves the user, guaranteeing what we suggest could be termed "privacy by proximity".

SMS to some appears to be perceived as increasingly personal in the light of the less personal and effortless interaction of Facebook. Receiving an SMS, for instance, can be seen

to signal that someone has thought of the recipient without being reminded to do so by Facebook, which gives it a special meaning to some:

> To me it really means a lot to get SMS messages… well, I get them every day, but it means something to me because I like it when another person has thought of you and thought 'damn it, I'm going to send her an SMS!'. And that's also why I think it's more personal. [On] Facebook it's so easy, there you can see if she's online or not and then you can write. But I think SMS… there… it's a bit like a postcard or something (Sandra, female, age 18).

Multimodal mobile communication

So far the analysis has mainly discussed the use of SMS texting vis-a-vis PC-based Facebook. Most of the respondents, however, also use mobile Facebook. Some respondents have taken up using mobile Facebook for most of their mobile communication:

> Facebook, I use that all the time. I use Facebook Messenger more than I use SMS […] yeah, actually instead of SMS almost. That's more for those I know do not check Facebook that often or do not have smartphones (Jacob, male, age 17).

The most characteristic use of mobile Facebook, however, is to frequently check the Facebook app, "tuning in, checking the frequencies to hear the latest, and then disengaging" (Goggin & Crawford, 2011: 228):

> Just going in there [on mobile Facebook] 15-20 times a day, just looking: 'OK, what's happened … I've got no notifications … oh well'. And then done. Out. It takes like 30 seconds being on Facebook if nothing has happened. Then you scroll down a bit and have a look: 'Oh, she's been for a run, interesting [ironic]. All right'. And then on to the next thing (Sara, female, age 18).

This indirect mode of keeping updated with various forms of information—what could be termed an "informational mode"—is emerging as one of the hallmarks of the smartphone versus traditional mobile communication (see also Bertel, In Press).

Since using Facebook on the smartphone is easy and convenient for the basic and most frequently used functionality (albeit not for more laborious writing tasks), it is becoming the default way of accessing Facebook for some respondents:

> If I need to go into groups or something and write, then I prefer to use my laptop. But it's almost always on the mobile phone (Line, female, age 16).

To others, however, the computer remains an important medium for accessing Facebook. These respondents bring laptop computers with them to school and have access to PC-based Facebook through much of the day. To them, mobile Facebook is, at this time, mainly a technology for when they are away from the computer and not necessarily one that they cannot do without:

> 90 if not 95 percent of the time that I am on Facebook it's on the computer […] it's not like I can't manage without Facebook on the bus on my way home." (Matthias, male, age 19).

> I could live with just having my computer. But sometimes it is just nice not having to carry that around all the time (Pernille, female, age 17).

Conclusion

In the light of the increasingly complex mediascape, it has been suggested that the role of SMS texting may be changing among Danish youth (Bertel & Stald, 2013; Helles, 2013; DR Medieforskning, 2013). The above analysis in general supports this view. Speaking of the reasons for this change, Helles has suggested that a significant part of the change in the use of SMS texting "is happening in the use of [SMS] texting for group communication, making texting a more clear-cut one-to-one practice, and shifting many-to-many communication towards SNSs [social network sites]" (Helles, 2013: 18). As Helles also points out, however, other factors also influence medium choice and while a functional perspective does indeed

help us understand some of the observed changes, the interviews analyzed in this paper suggest that SMS is subject to a wider ranging re-domestication than can be understood through a functional perspective alone. Indeed, use practices associated with SMS, the ties it has been found to support, and the meanings that users ascribe to the technology are all subject to ongoing negotiations.

Among these respondents, SMS is increasingly used exclusively for communication with strong ties, typically the closest network of friends and family that users have a (practical) need to communicate with in daily life. Facebook on the other hand has become the preferred platform for communication with weaker ties and is the medium that is typically used first with a new contact. Phone numbers are rarely exchanged until later; only after a relationship has developed will a person typically be included into the circle of texting partners (and later again voice communication partners).

Among the respondents, SMS remains an important tool of micro-coordination, indeed, negotiating various appointments and meeting with friends and family appears to be the most significant use of the technology. Today (micro-) coordination can easily be performed over other channels than SMS and often choosing among the many possibilities is a matter of “whatever works”. SMS (and voice calls), however, remains an easy-to-use and direct channel to the individual that is still more reliable than competing technologies. While Facebook has indeed taken over much group coordination through such purpose-tailored functionality as groups and events, only SMS and voice calls can be used to coordinate with people who do not have smartphones or a Facebook profile. SMS on the other hand is ubiquitous and taken-for-granted and functions as a communicative “baseline” in the communication repertoires of the respondents.

Patterns of social communication among the respondents are more complex and contested among the respondents. In general, SMS is used less for social communication than

used to be the case when the respondents were younger. One aspect of this change is that SMS texting simply is not as exciting to them as used to be the case; indeed, with the introduction of Facebook they now have an advanced multi-environment and multi-media platform for doing much of the "heavy lifting" of general sociability. Often, Facebook is described as a venue of entertainment and having fun, for communicating about matters that are "lightweight". Conversely, SMS to some is a more personal medium than Facebook (even than Facebook chat) and one that is more suitable for discussing private matters; in some cases SMS is perceived as increasingly personal because this demands a greater effort (thinking of someone) than the effortless communication on Facebook (which reminds users of their friends' birthdays etc.). Some, however, prefer to call when they have something important to discuss and some prefer to call altogether because this is easier than texting or simply experienced as a nicer interaction.

Taken together, it is clear that the use and meanings of SMS are undergoing a process of re-domestication at both functional and symbolic levels. The SMS technology today does not have the same central position that it did in the 2000s. It does, however, have a well established and well understood position, particularly as regards the more instrumental aspects of its use. The interviews show that as regards the ties one communicates with over SMS and the practices of coordination that are associated with the medium, these aspects have found new tentatively stable positions in the overall mediascape. The social communication aspects, however, are still being negotiated, the meanings associated with SMS (that are not easily reducible to affordances and greater ease of use of one platform over another) still characterized by being in flux.

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5 Summative Discussion and Conclusion

5.1 Introduction

This compilation has contained a set of diverse publications that are all concerned with the role of mobile communication in the lives of users. The guiding theoretical framework throughout the research has been that of domestication. In articles 2 (Bertel & Stald, 2013), 4 (Bertel, submitted), and 5 (Bertel & Ling, submitted) explicit reference is made to this framework while articles 1 (Ling et al., 2012) and 3 (Bertel, 2013) draw upon the framework in a more implicit manner.

The dissertation compilation overall can be said to contribute knowledge about the processes of domestication in the contemporary mediascape in two interrelated ways. 1) The dissertation examines the role that mobile communication has come to play in the everyday lives of users, that is the ever-evolving "outcome" of domestication processes. In the case of smartphones the dissertation has considered aspects of their domestication as they have been fitted into everyday life by young Danes. In the case of traditional mobile communication, most particularly SMS texting, it has considered how this has been re-domesticated in the light of newer media developments. 2) The research at a meta level provides insight into and expands the theoretical understanding of the processes of domestication. While this perspective is perhaps less clear in the individual articles of the compilation, it becomes clear when a bird's eye view is applied to examine patterns of domestication across them.

In what follows, I will discuss both these aspects in relation to the use of mobile media. First, I will discuss and summarize findings from the articles concerning the use of mobile media in the areas of information, location, and communication. Second, I will consider, at a meta level, aspects of the domestication processes as they have unfolded across the individual research publications in the dissertation.

5.2 Mobile Media and Information

In the empirical data analyzed in this dissertation the opportunity to access information irrespective of the time and place emerged as one of the aspects that were the most central to the respondents. When the Danish high school students interviewed in articles 3-5 discuss the significance of smartphones in their everyday lives, they typically point to the possibility to look up actionable information whenever and wherever as the most important feature of the device. That is, they first and foremost focus on the device's potential for instrumental uses such as looking up a bus schedule online, finding their location using a navigation

application, or checking their school schedule for cancellations before getting out of bed in the morning. In more abstract terms, what these users appreciate most about the smartphone is the fact that it provides access to various information systems in a more flexible way than was previously the case, allowing them to "flexibly align" their expectations, plans, and behavior with new or updated information available through those systems (Bertel, 2013, p. 304). One consequence of the smartphone's potential for facilitating this flexible alignment is that it increases the flexibility potential of individuals, who may increasingly rely on accessing system-provided information just-in-time as the need arises in dealing with the contingencies of everyday life. Indeed, the interviews conducted for this dissertation indicate that the persistent availability of actionable information—and the potential for flexible alignment this entails—is already becoming taken for granted as an integrated and relied-on part of the everyday media repertoires of the respondents in this study.

While it is often the instrumental uses of information that are mentioned as the most important, many of the respondents also mention using mobile Facebook to keep themselves socially updated with their extended network of friends (Bertel & Ling, submitted, p. 20; Bertel, 2013, p. 303). A typical use of mobile Facebook is that the young Danes in the sample check their news feed—frequently and sometimes almost habitually—often without writing or otherwise communicating actively (similar findings have been presented by Goggin & Crawford, 2011; Humphreys, von Pape, & Karnowski, Forthcoming). I have referred to this practice using Crawford's concept of "listening"—a reconceptualization of the traditional concept of "lurking" that distances itself from the negative connotations associated with the original concept by stressing that the act of listening is in fact often an active process that forms the basis for later action (Crawford, 2009, 2012).

The two broad and central practices described above—"flexible alignment" and "listening"[20]—are indicative of what can be considered an "informational" dimension of mobile communication where individual users use the mobile connection as an interface to access different kinds of systems-based information irrespective of the time and place and independently from other individuals. This is in contrast to previous mobile use practices which were mainly about being in contact with others through acts of direct person-to-person communication. Thus, users may be said to become increasingly autonomous in the context

[20] The practices are, of course, often overlapping as when the practice of listening provides information that facilitates flexible alignment.

of social relationships while simultaneously coming to rely more on technology when engaging in such "informational" use practices.

The informational dimension is one of the fundamentally new aspects of mobile communication introduced with the smartphone and the interview material analyzed in this dissertation indicates that such uses are central with the smartphone phenomenon. Table 3 juxtaposes the practices of informational use to previous examples of mobile communication practices along the dimensions of instrumental and expressive uses.[21]

	Instrumental	**Expressive**
Communicational mode (Social use context)	Example: "Micro-coordination" (Ling & Yttri, 2002)	Example: "Connected presence" (Licoppe, 2004)
Informational mode (Individual use context)	Example: "Flexible alignment" (Bertel, 2013)	Example: "Listening" (Crawford, 2012).

Table 3: The informational and communicational dimensions of smartphone use.

The purpose of table 3 is to illustrate that mobile communication with smartphones has been extended with an informational dimension—indicated by the practices of flexible alignment and listening—that is mainly associated with an individual use context where traditional mobile communication is mainly associated with a social use context. The table does not aim to be an exhaustive summary of smartphone use practices or mobile communication. Other modes of use, such as for instance information that is sent to or collected by, for example, "crowdsourcing" information systems (Agar, 2013, p. 226) or the quasi-broadcast "mass self-communication" (Castells, 2009) characteristic of for instance Twitter (which very few of the respondents use), has been deliberately omitted.

5.3 Mobile Media and Location

Persistent access to information about one's location in navigation apps is one of the most valued functions of smartphones among the young Danes interviewed in this study (Bertel, 2013). While not something most respondents use every day—unlike, say, online access to their school schedule—the smartphone's potential for just-in-time access to location information ensures that they always have the ability to find out where they are and how to get to where they need to go. This affords them a sense of security as well as increased flexibility in the management of everyday life as location information does not have to be looked up before going somewhere but can be looked up when the need arises en route.

[21] In this discussion I use the term "instrumental" to refer to all practices that can be considered goal-oriented and the term "expressive" to refer to all practices that can be considered social-oriented/process-oriented.

While location information has become a relied-on part of the *individual* smartphone use practices of these young Danes, it has not to the same extent become part of their *social* use practices and communication (Bertel, submitted). This is in spite of the fact that the literature on locative media has suggested that the social sharing of one's location (often via so-called *check-ins*) in networked media such as Facebook is a social practice that may potentially be associated with significant social consequences. The literature has found that location information may, for instance, be shared for purposes of coordination, helping users meet up in public spaces. The literature has also suggested that location information when shared for expressive purposes may become an important part of the individual's presentation of self and furthermore may help users create and sustain presence as well as to document their spatial behavior for the benefit of self and others, generating social capital in the process (Bertel, submitted, p. 8).

These claims and findings from the existing literature, however, are not confirmed by the research on location check-ins on Facebook presented in the dissertation.[22] The young Danish high school students who participated in the interview study do not use location sharing via check-ins on Facebook for coordination. In this instrumental context, it is simply not clear to them why they would attempt to coordinate via check-ins when they have more direct and efficient options—such as SMS and Facebook chat/Messenger—available.

In the context of expressive communication the picture is less clear-cut. Approximately half of the respondents have shared their location with others via check-ins on Facebook at some point but most of them rarely do so. Furthermore, when others share their location on Facebook it is often perceived as being irrelevant by the respondents and sometimes it is perceived as downright annoying; this is particularly the case when the check-in occurs in surroundings that are either too trivial (for instance in school) or "desperately" self-presentational (for instance at the fitness center). By checking in, the user thus runs the risk of violating the implicit norms of acceptable Facebook behavior—for instance the expectation that Facebook posts should be either useful, interesting or fun for others. Often check-ins are perceived to be neither, which means that self-presentation using such functionality becomes a precarious matter, one that cannot be assumed to necessarily create presence or generate social capital. There are, however, some contexts where sharing of location information via check-ins is less risky and may be more suitable for the purposes

[22] It should be stressed here that the sharing of location information is, of course, often important to the respondents in contexts other than location check-ins—for instance in direct person-to-person communication such as SMS as well as more indirectly through the sharing of holiday photos etc.

mentioned above; these include checking in to special meaningful and cool places, in the social company of (tagged) others, or in the context of other communicative forms such as text or photos where the (otherwise communicatively "thin") check-in becomes part of a richer social narrative.

5.4 Mobile Media and Communication

SMS texting has been crucial to the adoption and use of mobile phones in Scandinavia. Originally intended as a feature for service messages to mobile phone subscribers (Hillebrand et al., 2010), teens discovered the communicative potential of SMS and made the technology their own, developing elaborate cultures around the practice of texting (Caron & Caronia, 2007; Ling & Bertel, 2013). Over time, the technology has come to be an entrenched part of the everyday lives of virtually all young people in Denmark and the other Scandinavian countries.

In recent years, however, new media have been introduced to the mediascape that offer functional alternatives to SMS texting. The most prominent example in Denmark is the widespread adoption of the multifaceted Facebook platform, used mainly on computers but increasingly also on mobile handsets. Some researchers have suggested that the availability of such alternatives may influence the use of SMS (Bertel & Stald, 2011; DR Medieforskning, 2013; Helles, 2013) and the present research supports such a view (Bertel & Ling, submitted). Among the young Danes interviewed in the present study, SMS is increasingly used exclusively for communication with strong ties, typically the closest network of friends and family that users have a (practical) need to communicate with in daily life. Facebook on the other hand is used to communicate with weak ties to a larger degree; in fact, it has become the preferred platform for communication with this category of ties and is the medium that is typically used first with a new contact.

In an instrumental context of use, SMS remains an important "baseline" tool for coordination between individuals as virtually everyone has an SMS-capable mobile phone and it is a communication form used and understood by most Danes (Statistics Denmark, 2012a). To use mobile Facebook, on the other hand, requires smartphone ownership—and mastery—as well as a Facebook account. With around a quarter of young people—and around half of the total population (Statistics Denmark, 2013)—not owning smartphones in 2012 (Aarup et al., 2012) mobile Facebook clearly is a less reliable channel for coordination. It is, however, also clear that when both communication partners are mobile Facebook users then Facebook may be used for (micro-) coordination purposes to the same extent as SMS.

Group coordination among the interview respondents, today mostly occurs on Facebook—leveraging the more efficient and purpose-tailored group coordination tools of that platform. Typically this takes place on the personal computer ahead-of-time (again using a medium that practically everyone has access to).

In the context of expressive communication, patterns of use are more complex and the meanings associated with SMS more contested. In general, the respondents describe that they do not use SMS as much for socially motivated communication as they used to do when they were younger. One aspect of this change is that SMS texting simply is not as exciting to them as used to be the case. To many of the respondents, Facebook has become the venue for entertainment and having fun, for communicating about matters that are "lightweight". SMS, on the other hand, is often perceived as a more personal medium than Facebook—to some more so than even Facebook's chat functionality despite this channel having affordances very similar to those of SMS—and one that is more suitable for discussing private matters.

5.5 Processes of Smartphone Domestication

Adopting a bird's eye view on the research presented in this dissertation, two distinctions have been central: 1) the distinction between instrumental and expressive uses of mobile media and 2) the distinction between individual and social contexts of use. For the purposes of this meta level discussion, these distinctions may be said to represent different dimensions along which the domestication process appears to differ. Table 4 summarizes how the domestication process varies across these four dimensions in the articles of the compilation.

	Instrumental	**Expressive**
Social use context (person-to-person)	Usefulness of a technology is assessed in social relationships. If the technology is more efficient for some purpose than other technologies, the switch may happen rapidly and relative unequivocally; if not then rejection may be similarly quick. Examples: - Article 5: The switch to using Facebook to coordinate groups and the continuing use of SMS for group coordination when not all can be assumed to have smartphones. - Article 4: The non-use of check-ins for coordination.	Usefulness and appropriateness of a technology is assessed and negotiated in social relationships. Connected to matters of personal and group identity, media choices are complex and less clear-cut than in the instrumental context. This dimension may be characterized by both greater willingness to use and greater resistance to switch to new technologies than the instrumental dimension. Examples: - Article 5: The divergent meanings assigned to SMS vis-à-vis Facebook (despite similar affordances SMS to some is more personal than Facebook, to others it is not). - Article 4: The diverging perceptions of the appropriateness of checking-in on Facebook (some are willing to use check-ins, others disapprove).
Individual use context (not person-to-person)	Usefulness of technology is assessed by the individual and the decision to use the technology may be quick. Examples: - Article 3: The taken-for-granted informational use of smartphones, "Flexible alignment".	Usefulness of technology is assessed by the individual and the decision to use the technology may be quick. Examples: - Article 3 & 4: The taken-for-granted informational use of smartphones, "Listening".

Table 4: Summary of the process of domestication related to dimensions of smartphone use across the articles of the compilation.

Considering first the individual dimension of use it is clear that the process of domestication—of finding a place for the technology in everyday life—has moved quite swiftly in this dimension. Article 2 (Bertel & Stald, 2013) suggested that there might not be a strong preexisting need for using the internet on the mobile phone among young Danes, as they already have access to the internet on laptop computers at home and in educational institutions as well as many other places. However, they come to appreciate the extra connectivity offered by the devices once they acquire one (Bertel & Stald, 2013, p. 203). In case of the high school students interviewed in article 3-5, it is apparent that even if they have only realized how useful the smartphone is after they got one (Bertel, 2013, p. 304), having persistent individualized access to information is already becoming taken for granted as part of their relied-on everyday media repertoires (Bertel, 2013, p. 309). While instrumental information is often pointed to as the most important—as this information is often more

critically important than keeping socially updated—the process of domestication has been rapid in both the instrumental and expressive dimensions of the individual use context as the appropriation of technology is not necessarily subjected to negotiations with other individuals. This is, however, not to say that the social context does not influence—or is not influenced by—an individual's use of a technology; as article 3 (Bertel, 2013) has shown individualized use may indeed have consequences at the interpersonal level. It is, however, clear that the individual use of smartphones can occur relatively independently from other individuals because it can be used for things other than person-to-person communication.

Turning to the social use context it is clear that this dimension is more complex than the individual context of use. Looking first at the instrumental dimension of social use, the articles have indicated that when use practices are instrumentally motivated then the process of domestication may be quite quick and the transition between technologies relatively clear-cut. For instance, article 5 (Bertel & Ling, submitted) has shown that Facebook has—among these young Danes—in most situations taken over the coordination of groups from the mobile phone because the purpose-tailored many-to-many communication functionalities found on Facebook are more efficient for group coordination than the principally dyadic communication characteristic of SMS (Bertel & Ling, submitted, p. 8). Conversely, article 4 (Bertel, submitted) has found that location information is not shared on Facebook for coordination purposes because this indirect form of communication does not offer any perceivable benefit over more direct forms of communication such as voice calls, SMS, and Facebook chat/messages.

However, looking next to the expressive uses in the social context of use, the situation is more complicated. In article 5 (Bertel & Ling, submitted), some respondents experience SMS to be a more personal medium than Facebook chat/messages despite the two formats having very similar affordances. In the context of sharing location information, some show a greater willingness to experiment with sharing location for expressive purposes than when the purpose is instrumental. As such, expressive use in a social use context is more elastic in both directions—characterized by a greater willingness to experiment but also with less inclination to stop using a technology that is in many ways more cumbersome than newer alternatives.

The significance of the summary in table 4, however, clearly should not be overstated as the empirical material analyzed in the three papers does not warrant far-reaching generalization about the processes of domestication. The summary does, however, indicate some interesting points. The most significant point is that the domestication processes

surrounding smartphones include a strong individual component making certain uses more a matter of personal preference than social negotiations. This is due to at least two interrelated properties of the smartphone in particular. First, the material aspects of the smartphone and its use remain relatively stable even if the "symbolic environments" (Hartmann, 2006) that are accessed on the device may change dramatically. From the perspective of a co-present other there need not, for instance, be any clue that an individual has switched from using Facebook to going through the day's readings for class on a smartphone handset. The outward stability and inward malleability of the smartphone means that the domestication of such devices to a large extent becomes a matter of domesticating the symbolic environments that are used on the smartphone platform (that is, the "content" of the device). Since this dimension is only immediately apparent to the user of the smartphone, a significant part of the domestication process becomes individual. Second, many of the functionalities available on smartphone handsets are fundamentally individual. An e-banking, weather, or navigation app are all first and foremost used by individuals. Even if they may occasionally be used by individuals in social contexts, this is often a choice rather than a given. This is in contrast to the most significant functionality on the mobile phone which—being about communication—was fundamentally social.

Not all uses are, of course, individual. The smartphone provides access to traditional mobile phone functionalities and various new forms of communication as well. In this context, the usefulness and appropriateness of a technology or mediated behavior becomes a matter of interpersonal negotiation to a higher degree, as it was and still is with e-mail, SMS, voice calls, Facebook etc. The most interesting point in this context is that the present research suggests that the purpose of the communication appears to strongly influence the choice of medium with instrumental uses seemingly prompting quicker transitions between competing technologies than expressive uses.

6 Conclusion

As stated in the first line of the introduction, recent years have seen great changes in the mobile mediascape and mobile communication in Denmark; this has been due in particular to developments in mobile media themselves but also in the mediascape that surrounds them.

The research presented in the five articles of this dissertation compilation, taken as a whole, has covered a transition from an "old regime" of mobile phones into a "new regime" of smartphones situated in a complex media environment that is characterized by softened lines of demarcation among different media forms. The analysis began with an examination

of the state of SMS texting when this technology was at its overall peak in 2007 (Ling et al., 2012). It transitioned through an exploration of the use of the internet on the mobile phone and the emergent smartphone phenomenon it was associated with in early 2011 (Bertel & Stald, 2013). Finally, it ended with an examination of the use of information (Bertel, 2013), the use of location (Bertel, submitted), and communication (Bertel & Ling, submitted) on mobile handsets in late 2011 and early to mid 2012.

In terms of domestication, the research has examined how SMS as a fully domesticated and deeply entrenched medium (Ling et al., 2012) over relatively few years became re-domesticated—gaining a new position in the light of more recent media developments (Bertel & Ling, submitted). Furthermore, the dissertation has examined central aspects of how the smartphone became domesticated—a process that is still ongoing. It has studied how the perpetual access to information systems afforded by the smartphone has become a relied-on and taken-for-granted part of everyday life of a sample of young Danes (Bertel, 2013). This is despite the fact that there was not necessarily a strongly felt preexisting need for the functionality the smartphone provides among the respondents of this dissertation given the already media saturated context of Danish society (Bertel & Stald, 2013). The research has also examined how and why a promising new technology, mobile location sharing via check-ins on Facebook (and elsewhere), has failed to take off in a Danish context (Bertel, submitted). Finally, the dissertation has considered the process of smartphone domestication at a meta-level. Looking across the individual articles, it has argued that the domestication process has differed depending, in particular, on whether use takes place on an individual or social basis and whether the purpose of the use is instrumental or expressive.

Mobile media, it is clear, have not stopped evolving after data collection in the present dissertation was completed in April 2012. Indeed, still in its early stages, the field is continuously developing, the use of smartphones becoming ever more multifaceted and branching off into areas of use that few would have been able to anticipate a short while ago. As such the area represents a rich field for further research, one that the author hopes this dissertation has been helpful exploring the early stages of.

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